THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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Vol. XXXI. No. 789.] LONDON, JUNE 25, 1878. [30th Year.] Price 6d.

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1862.

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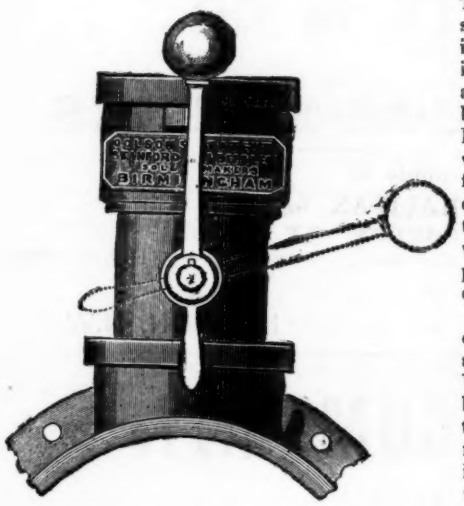

THIS Valve is designed to supersede the hydraulic seal, and is intended to be placed immediately in or on the retort mouthpiece, or at such a distance therefrom as to be within reach of the workman. By the use of these Valves, the whole of the pressure is removed from the retorts, and a largely increased make of gas per ton obtained; the deposit of carbon is very slight, choked ascension-pipes are unknown, and the quality of the coke is improved.

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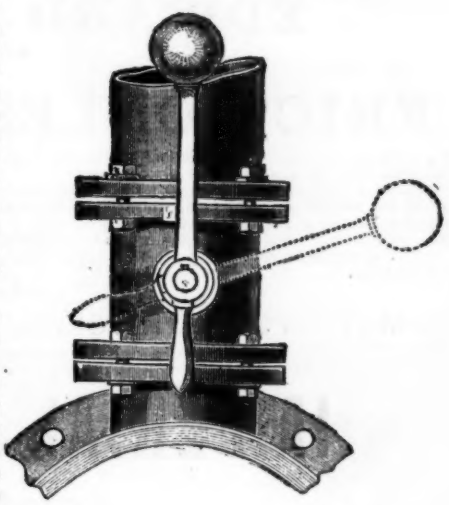

Upwards of one hundred of these Valves have been continuously at work during the past six months at the Windsor Street Works of the Corporation of Birmingham, and no difficulty has been experienced in working retorts fitted with them in combination with others worked in the usual way with the hydraulic seal.

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Corporation of Birmingham Gas Department, Windsor Street Works, Feb. 17, 1878.

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DEAR SIRS,—In reply to your inquiry, I beg to say that the Valves (Colson's Patent) supplied by you in July last have given entire satisfaction. The retorts fitted with them are worked side by side with others having the ordinary dip-pipe, without any difficulty being experienced.

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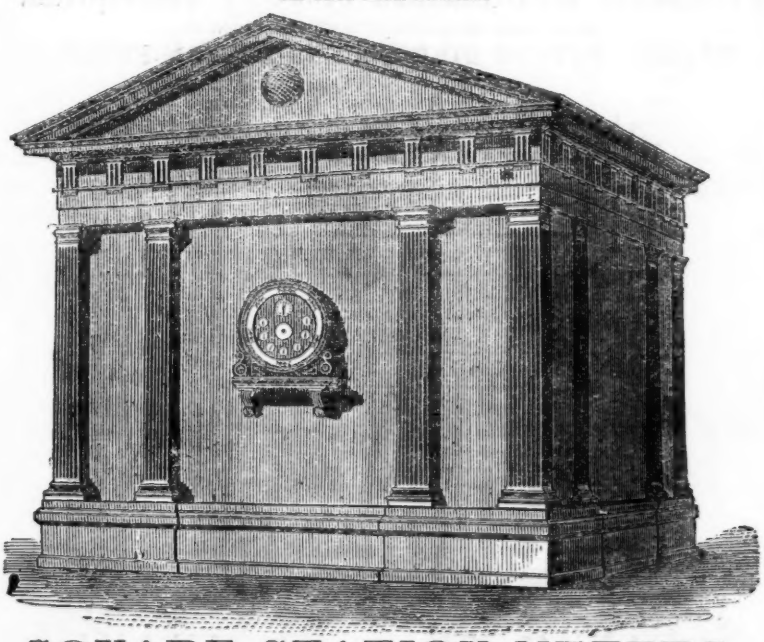

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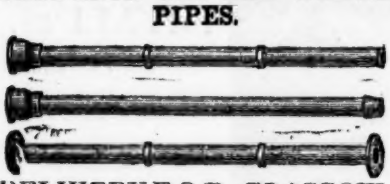

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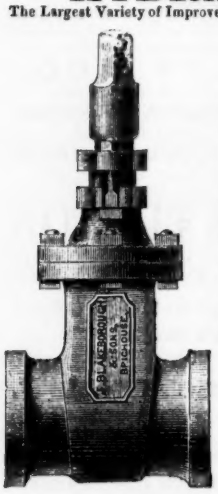

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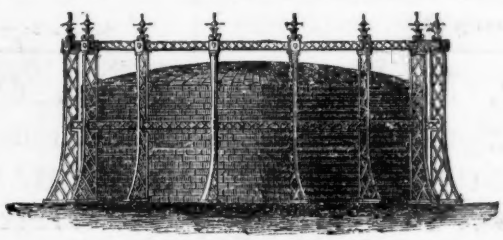

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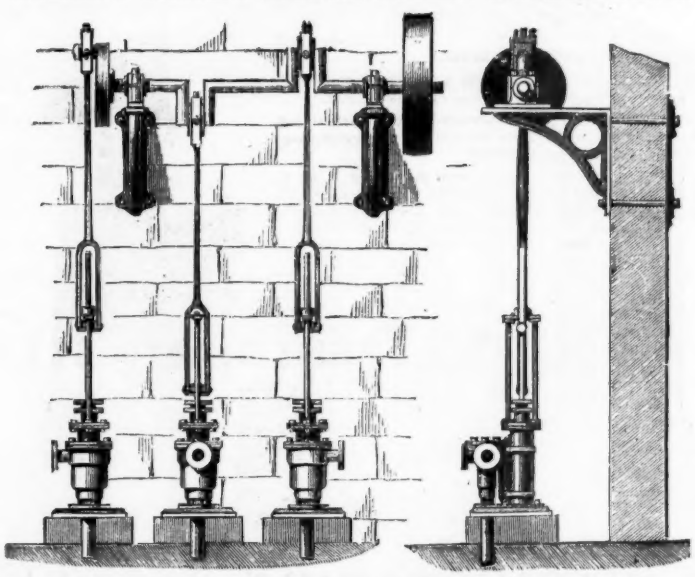
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.
For Water. For Tar. For Ammoniacal Liquor.
This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.
These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.
GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.
Illustrated Catalogues sent post free on application.

TANGYE BROTHERS AND HOLMAN,

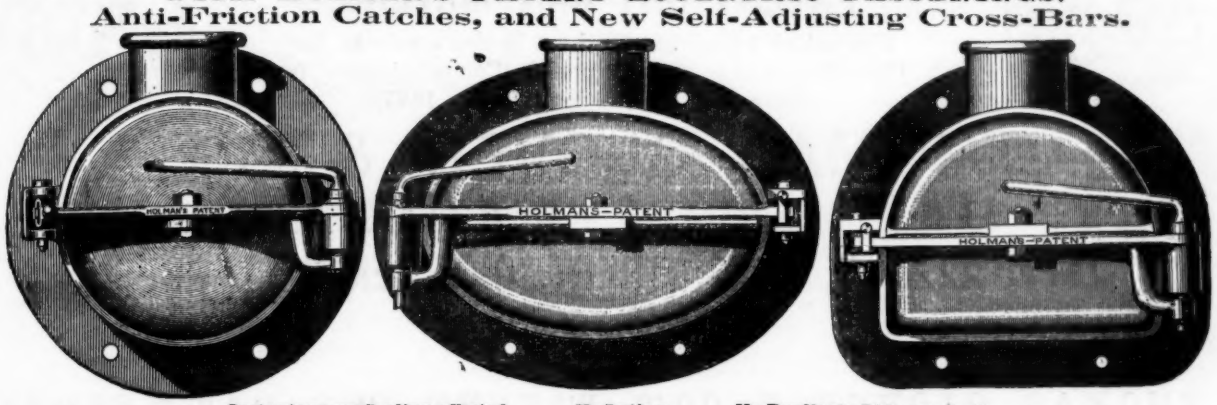
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS.

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

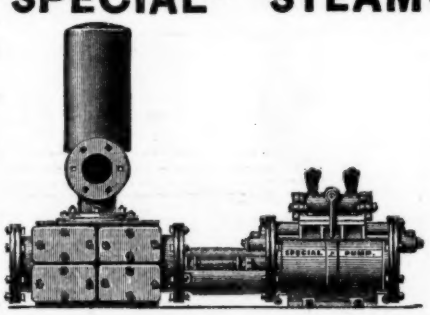
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

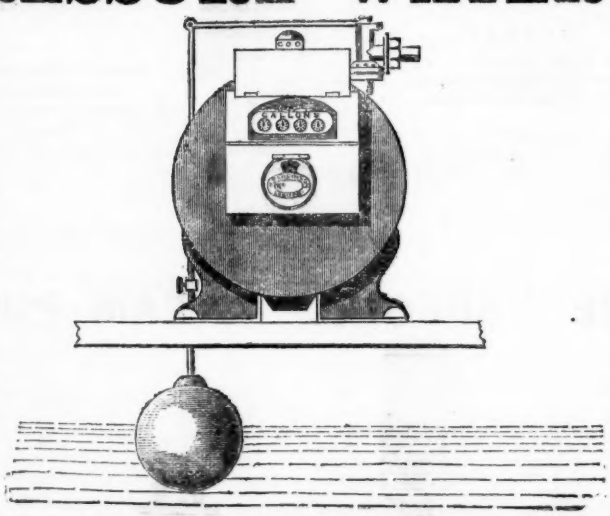
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co for more than 25 years and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 25, 1878.

Circular to Gas Companies.

THE meeting of the British Association of Gas Managers, which has just concluded, as every one who attended will admit, was one of unsurpassed success. Former, and indeed, we may say, every one of the meetings, has been agreeable and instructive; and it is not saying too much that the last equalled in agreeableness and instructiveness any one that preceded it. But the meeting is not yet over. At the time we write, the Members are in Paris, with lovely weather, and everything around them to satisfy the senses and gratify the intellect. We hope the fine weather will last, and that the Members will return to England highly pleased with their visit. There is, as we said last week, a great deal to be learnt in the Paris Gas-Works; but we will not offend any one's sensibilities by pointing out what, in our humble opinion, is most worthy of notice and copy. Let every one see and observe for himself, and then we are assured that, as opportunity offers, some changes of plant and practice will be made in some of our gas establishments. Perhaps the objects of the meeting may not take the Members to the Rue Condorcet; but we cannot help thinking that the Directors who have visited Paris must have been struck with envy at the sight of the magnificent suite of offices belonging to the Gas Company. If we have nothing to match them in London, it is because our interests are scattered and divided. Union would enable us to indulge in luxuries and conveniences such as are enjoyed in Paris.

To return to the Adelphi, however. We may say that we do not commence our report of the proceedings to-day, because this is the last number of a volume, and it will be convenient to our readers to get the whole of the report in one. We may, however, make a few remarks upon the leading features of the President's Address. In the first place, it is gratifying to us, as to the President, to witness the increasing growth of the Association. It shows how highly the advantages which the Association offers are appreciated; and yet we are not certain that they are even now sufficiently recognized. The roll of Members does not include all English Managers, as we hope it will before long. It is true that a variety of Local Associations are in existence, and we see that the number is being added to; but, useful as these small societies are for colloquial intercourse, we much question whether they are so beneficial in their results as the larger gathering, which offers the opportunity of making a wider acquaintance with men, and a fuller interchange of ideas. For this reason we trust the British Association will continue to increase, and, with the President, hope that another year will find the Members with a larger time at their disposal for useful work.

The President was perfectly right in insisting that it is the duty, as it is to the interest, of the Directors and Corporations to give their Managers more time and more means to attend these meetings. The discussion on several papers was necessarily curtailed, and on some no discussion at all took place. This may not have been of much consequence; but discussions often bring out points of great interest, which are not alluded to in the papers that provoke them.

The rapid progress of gas industry is bringing about some changes, upon which we may congratulate ourselves. The Manager of to-day is not exactly the kind of man who undertook the management of gas-works forty years ago. There were great men, it is true, in those days—men whose names will be honoured as long as the art of lighting by gas exists. But there were relatively few. Now, although we may not have a Clegg, a Lowe, or a Grafton, we have men whom their practice and teachings have instructed, established all over the country. Something more, however, is wanted. We are not exactly in love with any examination system; but the time is fast coming when Gas Managers will be expected to have a special training, and it may be a function, some day, of the British Association of Gas Managers to prescribe some course of instruction which will qualify gentlemen to fulfil their duties.

Managers are required to know something of many arts and sciences; their case, in fact, somewhat resembles that of the doctors. Although we have no desire to subject them to a similar training, some course of instruction would be advisable, if it could be followed. Engineering is the chief point to which attention should be directed. Architecture and Construction are also necessary parts of a Manager's training. The study of chemistry must also form an essential part in his education.

The subject of commissions was, of course, lightly touched upon by Mr. Woodall. With the opinion which we have repeatedly expressed he perfectly agrees—viz., that equal dishonour attends him who gives and him who takes. We hope the time will shortly arrive when Gas Managers will no longer be tempted; but the system has been so many years in existence that to eradicate it will take a long period. Time was, we believe, when it was considered a correct thing for a Secretary to take commission on coals, and for an Engineer to take the same upon everything else that was bought by the Company. Ideas are, however, changing, and as a Manager's services begin to be better appreciated, and more highly remunerated, the pernicious commission system will come entirely to an end.

We are here reminded that, when speaking of additions to salaries of Corporation Gas Managers, some objections were taken to remarks recently made in our columns. We never intend to speak with disrespect of Corporations, unless we think they deserve it. We entirely object to their having possession of gas and water undertakings, which we regard as purely commercial enterprises, and as foreign to the proper functions of a governing body as would be the supply of bread and meat. Pushed to a logical conclusion, the arguments which are indulged in when a Corporation Gas Bill is considered, would justify the supply of every edible and drinkable commodity by a Local Authority. Meat and bread are as much, or more, necessaries of life than gas and water, and it may be that some day these may be demanded

from a Local Authority. We have, in fact, seen a hungry mob around a Vestry Hall, howling for bread, and such a sight will probably be seen again. Apart, however, from considerations of this kind, we are by no means averse to the possession of gas undertakings by Corporations; but the misfortune is that corporate work must be done to a great extent in public. Corporations cannot wash their dirty linen in secret, and we certainly do think it a great misfortune that, when the question of a small increase in a Manager's salary is brought under consideration, remarks should be made, and necessarily published, which cannot fail to give pain to the gentleman whose case is being discussed. We know that similar discussions take place at Boards of Directors, but these are secret. Managers at these meetings have not their ability and skill discussed in public. The only hint we desire to give to members of Local Authorities, when personal matters come up for debate, is, that they should content themselves with voting, and refrain from speaking.

We shall have occasion, as we publish the proceedings at the meetings of the Association, to refer to many things which, for the moment, we are compelled to put aside; now, as we said before, we content ourselves with noticing only the chief features of the meeting. One thing, which caused us some pain and regret, was the absence of faces which, if our memory serves us, have always been seen at previous gatherings. Among the absentees we may mention Mr. Goddard, sen., of Ipswich; Mr. Douglas, of Portsea; Mr. Paterson, of Warrington; Mr. Hutchinson, of Barnsley; Mr. Simpson, of Rugby; Mr. Martin, of Ormskirk; Mr. Andrews, of Swansea; Mr. Garnett, of Ryde; and Mr. Wood, of Hastings. As time rolls on, the list of original Members must necessarily be thinned; but we cannot part with old acquaintances without regret. Some of the gentlemen we have named, we know, are hale and strong, and we can only suppose that important business detained them at home. The rest have our hearty wishes for a speedy restoration to health, which will enable them to be present at the next meeting, to be held at Newcastle-on-Tyne, under the presidency of our veteran friend Mr. Warner, of South Shields.

Of the festivities we need say but little. The dinner was good, the company genial, and the speeches excellent. The entertainment at the Phœnix station, on the following day (in the preparation of which a lady evidently had a hand), and that at Bushey, were simply perfection. We believe that the Members will long hold in their memories the meeting of 1878.

When speaking of the winding-up of the Stafford Gas Company last week, we were, by local reports, led into an unimportant error. The Stafford Improvement Act, 1876, makes it, we find, obligatory on the Company to divide the whole of the purchase-money among the Shareholders, leaving nothing to be distributed, by way of compensation, among the Directors and Officers. It was not, therefore, niggardliness on the part of the Shareholders which left the eminent services of their Directors and Manager without substantial recognition. It is now a voluntary business, and we hope that the long service of their Manager, who is a man of mark in his profession, will receive at the hands of the Shareholders the reward he deserves as the Company expire. The Directors, several of whom have been in office for many years, during some of which they received no remuneration whatever, will also, we hope, be remembered.

The gas accounts of the Corporation of Rochdale show very favourable results for the past year's working. The reduction made in the price has evidently brought new consumers, and, although the consumption has not increased, profits have been maintained. The works appear to be in a transition state, but will presently take their place as equal to any Corporation works in England.

Gas is so often abused by doctors, that it is pleasant to find in a medical periodical an article which defends its use, and shows that, taking light for light, the consumption of gas vitiates the atmosphere of a room less than any other illuminating agent. We pass by sulphur compounds, which are, of course, peculiar to the burning of gas, with the remark that the quantity of these, and their effects on both health and furniture, are always over-estimated. We note this paper, which will be found in another column, for it looks like a return to common sense on the part of the medical profession.

Water and Sanitary Notes.

Everybody knows that England has a Registrar-General, and that somewhere in Somerset House there is a comfortable apartment with an easy-chair, a Turkey carpet, and an official table, at which important business is transacted. The functions of the Registrar-General, as the name indicates, are to collect statistics of births, deaths, and marriages—work which, we are bound to say, is remarkably well performed. But certain officials in the department persistently wander from their proper duties, and trouble their heads with matters which by no means concern them. Thus, in the valuable "Summary of Births, Deaths, and Causes of "Death in London and other Large Cities for 1877," recently issued, we find the writer going altogether out of his way to give a statement of the accounts of the Metropolitan Water and Gas Companies. The object is, of course, to show that, under Municipal arrangements, capital might be more cheaply raised, and, profits remaining the same, a considerable excess of revenue left for application to public purposes. In other words, the writer suggests that the Companies should be bought up, and the supply of gas and water be placed in the hands of some governing body. Now, this is altogether out of place in the document we notice. The Registrar-General is in no way concerned with the gas and water supply, except in so far as they concern public health. The financial position of the Companies is entirely outside the business of the Registrar-General.

London continues to be the healthiest large city in the world, and there can be no doubt that one essential element conducing to this healthiness is its excellent and plentiful water supply. The rate of mortality last year was below the average; but, at the present time, it is too early to speculate or dream of a maintenance of this low rate. We sincerely hope that it may continue; but the consequences of our new sanitary arrangements are not yet fully established. That our main drainage system, which, we read in this summary, has been completed after twenty years exertion, has been productive of excellent results, we have no doubt; but other things may have contributed to the general healthiness, of which an official statistician takes no notice. London is in course of transformation; the Artizans Dwellings Act will, in time, effect most valuable improvements, and, it may be, epidemic diseases will become more and more rare. We do not expect that either typhoid fever or small-pox will entirely cease; but the more air that is admitted into our streets and dwellings, will undoubtedly render them less liable to become epidemic.

That the manufacture of sulphate of ammonia can be conducted so as to cause no offence, is, in our opinion, beyond question, and we shall, therefore, not quarrel with the recent judgment at the Court of Queen's Bench. Sulphuretted hydrogen is a nuisance of the foulest character; not that it produces disease, although a medical man has written that it is the specific poison of scarlet fever; but simply because it is offensive to the sense of smell. Escaping vapours from the manufacture of sulphuric acid, less disgusting in their character, are possibly more obnoxious to health; and there is to be said, further, that any manufacturer who allows them to get abroad loses so much of his product. We hope, then, that Messrs. Wallace will speedily find a means for preventing the escape of both sulphurous acid and sulphuretted hydrogen, and of so conducting their works that their neighbours will make no complaints. The general public think lightly of the value of a large manufactory in a densely-populated neighbourhood, where the employment it affords to a considerable number of workmen is of much importance. Additions to plant will, no doubt, result in increased cost of production, and, in these days of keen competition, such cost may have a fatal influence on business. It now becomes a pressing question as to where what are called noxious processes can be carried on. They are driven every day further and further from our centres of population and are being gathered together outside, in a way which does not promise, in the long run, to promote the well-being of the people. Workmen must follow their work, and as land becomes more and more valuable, the wages class become more and more pressed together.

The Wigan Town Council hoped to share with Manchester in a supply of water from Thirlmere; but the failure of the scheme this session, has set parties to work in the hope of persuading the Council to take a supply from a colliery shaft sunk in the new red sandstone. Water from the sandstone is generally of excellent quality, and that from this particular source seems to offer no exception. The only thing in doubt is the permanence of the supply. We are told that that offered to Wigan and the neighbourhood is inexhaustible, but time might, perhaps, prove the contrary. Failing the success of the Thirlmere scheme in the next session, Wigan may very well have recourse to the colliery shaft for a water supply, which is offered to them at twopence per thousand gallons less than the Corporation of Manchester proposed to sell Thirlmere water.

The towns meeting at Durham, held under the Borough Funds Act, resulted in a vote authorizing the Town Council to expend public money in opposing the Bill; but a poll was demanded, which will presently be taken, and, unless appearances were deceitful, will result in the triumph of the opposition.

WATER GAS.

(*Continued from p. 946.*)

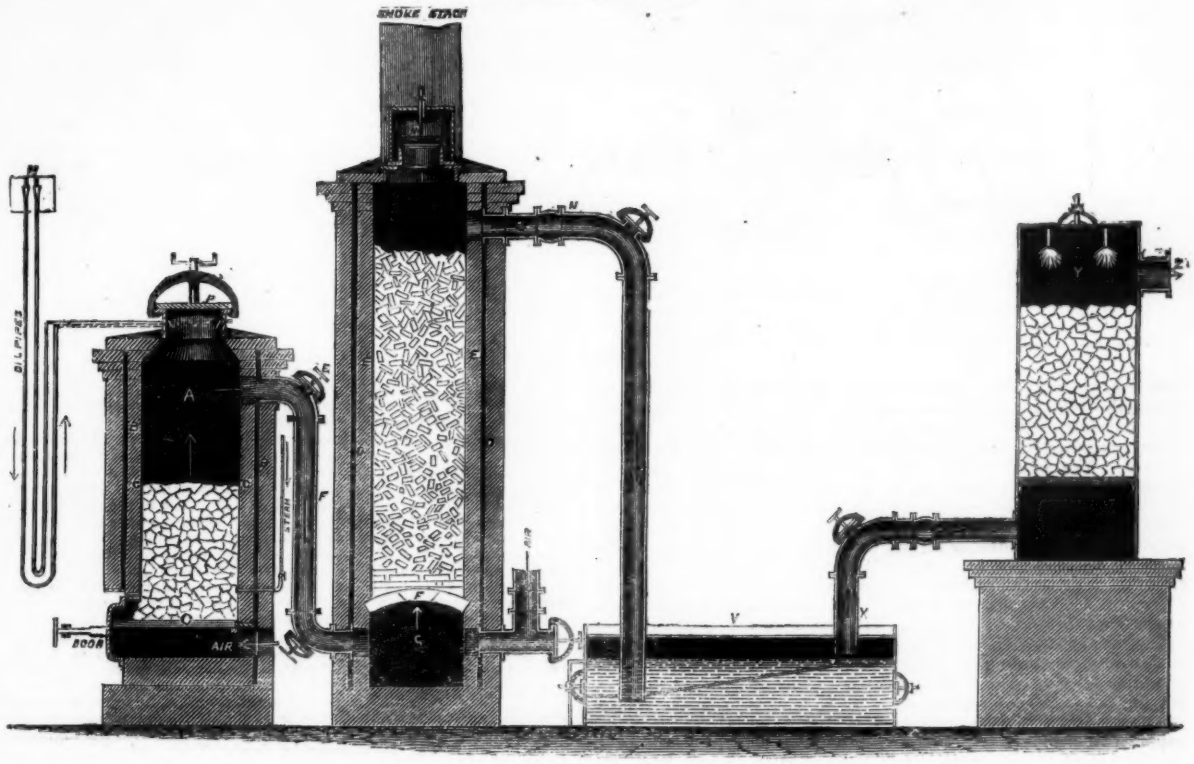


FIG. 5.

For the purpose of indicating the progress that has been made, or at least supposed to have been made, with respect to this matter, we reproduce a drawing of a water gas apparatus by Mr. T. S. C. Lowe, erected at Utica, in 1875, so as to compare it with the apparatus for the same purpose, patented in this country by Messrs. Lowe and Dwight, both of the United States, last January.

In fig. 5, A is the gas generator, 9 feet high and 28 inches internal diameter, half filled with clean anthracite, broken to rather a "large egg size." P is the man-hole for the supply of the same, projecting a little above the second floor or stage of the building on which the attendants stand. The apparatus next on the right is called the superheater, and is 15 feet high, and of the same diameter as the generator, and is, as shown, nearly filled with fire-bricks, indiscriminately arranged. V is a wash vessel, and Y a scrubber. To set the apparatus to work, the door on the left of the generator is removed, and a fire kindled underneath the coal, so as to fire it at its base. This door is then returned to its place, and fixed something after the manner of a retort-lid. A hot blast is now blown in at the port, marked "air," opposite the door just named. This, of course, intensifies the heat at the base of the coal, and carries the fire rapidly upward, producing intensely hot gaseous products of combustion. These, passing from the generator, A, descend the pipe, F, to the ashpit, G, when, meeting with a blast of the heated air, the combustive portion, carbonic oxide, immediately bursts into flame, and blazing up through the perforated arch, and fire-bricks piled thereon, soon brings the mass of refractory

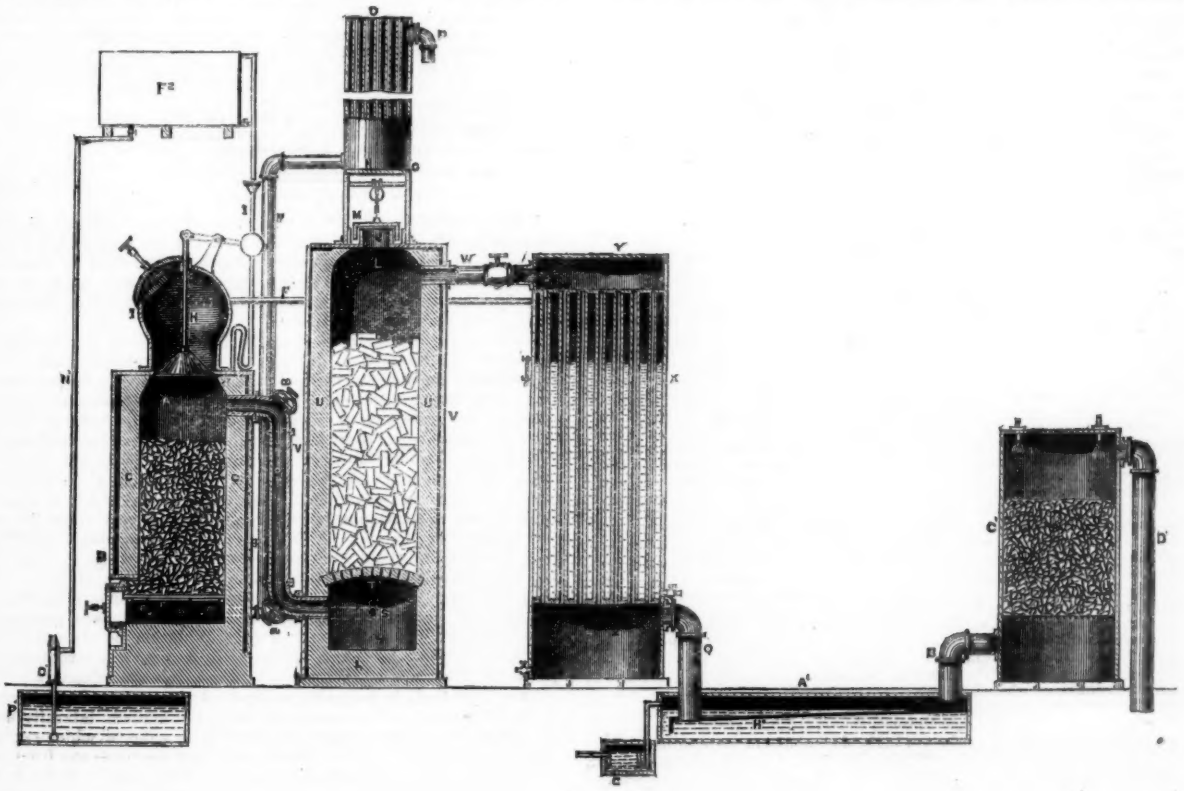


FIG. 6.

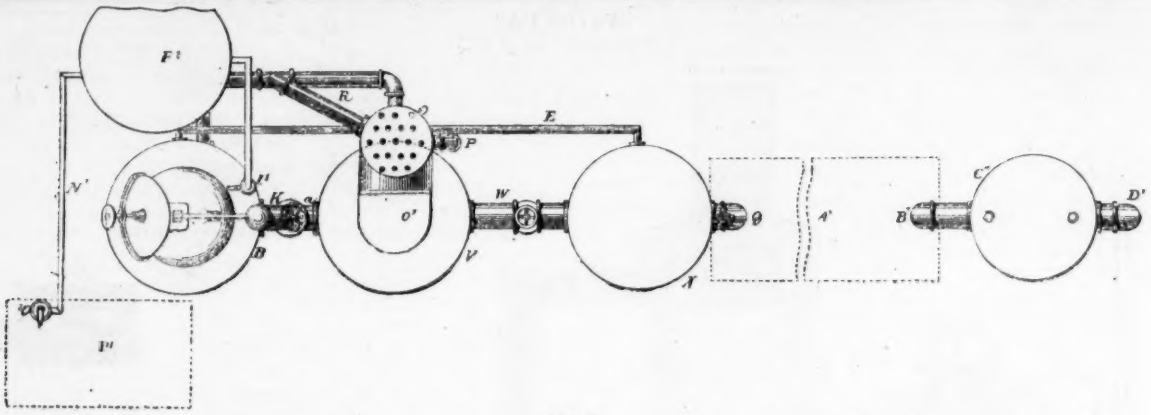


FIG. 7.

material to a very high temperature. The carbonic acid formed during this blowing-up process escapes with the nitrogen at the valve, H, and being intensely hot are conducted to the steam boiler to help in the generation of steam for all purposes connected with the manufacture. The solid carbon in the generator being now in a state of incandescence, and the material in the "superheater" being up to its point of intensity, the process for producing water gas mixed with some hydrocarbon vapour is commenced. The hot blast at both points is now suspended, or turned to another combination, and the valve, H, closed so as to prevent any loss at the "smoke stack." Steam from the pipe on the right of the generator is admitted in this case *above* the fire-bars into the midst of the incandescent fuel, and not, as usually practised, underneath. The result is the production of hydrogen and carbonic oxide, with a certain per centage of carbonic acid, varying according to circumstances entirely connected with the condition of the carbon in the generator. This gaseous mixture, on leaving the solid decomposing mass in A, mingles with the volume of hydrocarbon vapour generated in the space above, from oil supplied from the vessel, M, through the pipes marked "oil-pipes," on the left of the generator: this superaddition travels with the water gas down the pipe, F, to the ash-pit of the "superheater," from whence it ascends through the highly heated mass of fire-brick, where we presume the carbonic acid that escaped splitting up in the generator is converted into carbonic oxide, at the expense of the vaporous carbon intermixed instead of the solid in the decomposer, A. After this fiery ordeal, the gas passes to the washer, V, and to the scrubber, Y, and so on.

Before passing on to notice the last conception of Mr. Lowe and his associate, we ought to mention that Mr. Lowe does not put a fictitious value on his gas, by stating that it does *not* require purifying.

The patent of Messrs. Lowe and Dwight that we have already referred to is dated Jan. 14, 1878 (No. 173). This patent is for "Improvements in the process of, and apparatus for, superheating steam, and making heating and illuminating gas." The first part of the specification refers more particularly to the making of water gas for heating purposes. This is a similar apparatus to that we have been describing, *minus* the oil-supplying appendage, but *plus* a special superheater for the steam that is to be subjected to decomposition. As we do not suppose that sets of mains would be laid for the sake of supplying a gas for heat only, and believing that illuminating gas alone is what merits any attention at all, we shall produce that portion of the patent that has been elaborated, by improvements, for that purpose.

Figs. 6 and 7 show an arrangement for producing illuminating gas. The apparatus is just the same as what has, in the first part of the specification, been described for making heating gas only, with the addition of provisions for holding and supplying petroleum or other hydrocarbons.

"When it is desired to put this apparatus into operation a fire is built on the grate, E, in the generator, A, and the cup, M, of the stack, L, is raised out of the liquid seal to allow of the free escape of the waste products of combustion through the brickwork or other refractory material in the stack, L, and up through the tube in the heat restorer, N. Any suitable solid carbonaceous substances (preferably anthracite or bituminous coal or coke, besides which, however, may be mentioned any kind of wood, all kinds of woody rubbish, finely cut straw, coal dust or slack, asphaltum, or any material capable of generating heat) is then gradually introduced into the generator, A. In the meantime a fan blower, or other suitable apparatus, is caused to force air through the pipe, P, into the heat restorer, N, from which a sufficient quantity of warmed or heated air is admitted through the tubes R and G, to cause moderate combustion on the grate surface of the generator, A. As the thickness of fuel increases in the generator, A, and while it is being brought into an incandescent state, the carbonic acid, which is caused by the union of oxygen and carbon at the bottom of the generator, will pass up through the thickness of incandescent fuel, become re-carbonized, and be thus converted into carbonic oxide. This highly inflammable gas, in union with the sulphur of the coal, if that is used, and other impurities thrown off by the heat, leaves the generator, A, through the pipe, K, and is discharged into the combustion chamber, T, preferably heated air at the same time being admitted through the pipe, S, into the same chamber. A flame results, producing an intense heat, which passes up through the openings in the arch, T', and heats to bright redness, or white heat, the entire mass of enclosed open brickwork or other refractory material from bottom to top. In the meantime considerable heat, which ascends through the open tubes of the heat restorer, N, being carried in the waste products of combustion, is absorbed by the air, which is forced in an opposite direction down the heat restorer, around the tubes, and is returned to the lower ends of the generator, A, into the ash-pit, D, and the combustion chamber, T, for supporting the combustion in the same, thus lessening the length of time and amount of fuel to produce the necessary heat in the different chambers, the waste products of combustion escaping through the opening, J.

"After the mass of fuel, several feet more or less in thickness, in the generator, A, has become thoroughly incandescent, and the refractory material of the stack, L, has become highly heated or white hot, the steam (preferably superheated) is admitted into the generator at the same time that liquid hydrocarbon is admitted into the same in regulated quantities from the tank, F^2, and into the funnel, I^1, whence passing in through the curved pipe or pipes, it drops directly on to the hot coals in the generator, A. Here the liquid hydrocarbon is immediately volatilized into a thick vapour, and at this point the highly heated hydrogen, continually emerging from the top of the coals, instantly, and before having time to lose any heat, intermingles with and thoroughly permeates every particle of the volatile carbon, which has the effect of separating and subdividing the particles or globules of carbon, and of surrounding them uniformly with the proper proportion of hydrogen, so that the particles of carbon, not being able to come in contact with each other, are rendered entirely non-condensable, as has been proved by numerous experiments and long experience. These mixed gases pass through the pipe, K, to the bottom of the stack, L, and up through the mass of highly heated refractory material, whereby every portion of the gas coming in contact with the highly heated refractory material is thoroughly fixed. These mixed gases in their highly heated condition are carried off through the pipe, W, at the top of the stack, enter the chamber, Y, at the top end of the boiler, X, where they pass down through the numerous tubes of the boiler to assist in generating and superheating the steam therein. The gases, now considerably cooled, leave the tubes and enter the chamber, Z, and thence through tube Q pass into the washer, A^1, under the inclined diaphragm, H^1, under water, in which any soot, dust, or other impurity is deposited. From the washer the gas next enters the lower end of the scrubber, C^1, and after passing up through the contents thereof, is conveyed through the tube, D^1, to the holder or other point of storeage, or directly to any place of consumption.

"While generating gas as before described, a test burner will readily indicate the quality or candle power of the gas being produced, and the requisite carbon or hydrogen can be easily regulated by regulating the quantity of liquid hydrocarbon, or of steam, admitted to the generator, A.

"Whenever it is desired to restore the heat to the fuel in the generator, A, and in the stack, L, the liquid hydrocarbon and steam are both shut off, the closely fitting lid, I, is removed, the valve, O^1, is opened, and the mixed gases in the generator and in the stack are allowed to burn in the atmospheric air, which, unless this was done, would become explosive on the re-application of the air. The valve, O, is opened, and fuel is then added, if necessary, through this opening. The lid is then properly secured, air is again forced into the ash-pit, D, and combustion chamber, T, as before described, and a few minutes of time suffice to bring both the generator, A, and the stack, L, to the required heat, after which a large amount of hydrocarbon gas is again produced as before.

"When a steady flow of gas is desirable, two sets, or more, of generators may be employed, according to the requirements."

(To be continued.)

THE PRESERVATION OF IRON.

A new process for protecting iron surfaces from oxidation has been patented by Mr. George Bower, the well-known Engineer and Contractor of St. Neots. This process depends, like that of Professor Barff, on the formation of an unalterable magnetic oxide of iron ($Fe_3 O_4$), but the means by which this desirable end is accomplished are in every way very different.

Before laying before the readers of the JOURNAL OF GAS LIGHTING the details of the process, it will be well to remind them of the objections to the various methods at present in vogue for preventing rust. The most general plan, and, indeed, the only plan at all applicable to the protection of what may be termed "structural" iron, is to give it a coating of some kind of paint or composition, that will, as it were, form an envelop over the iron, and so protect it according to the impermeability of the envelop. Now, such a coating has a purely mechanical adhesion to the surfaces to which it may be applied, and is consequently readily abraded by very slight friction, and is also liable to scale off on exposure to atmospheric influences, thus involving frequent renewal and consequent expense. This does not, however, constitute the only objection to the use of paints, &c., as a far more serious one arises from the tendency of iron to "granular" rusting, which may be considered to be a progressive action which takes place with iron if oxidation be started at any one place, tending, of course, seriously to weaken any structure composed of that metal. Why paints, then, are objectionable will, in view of this fact, be tolerably evident; for if rusting has begun at some small point of the ruptured surface, it spreads laterally under the paint, which then simply serves to hide a defect which ought at once to be remedied. Iron articles for many purposes are frequently coated with some less oxidizable metal, as tin or zinc. If the former metal is used, the product is knowu as tinned iron, or "tin-plate;"

and if the latter, it is termed "galvanized." This method of protection, for small articles especially, is valuable and efficient, so long as the continuity of the zinc or tin film be not destroyed; but if it should be, the action set up between the tin or zinc and iron accelerates very materially the destruction of the metal.

For many years past it has been well known to chemists that if it were only possible to give metals a coherent and permanent coating of their own oxides, in many cases further destruction of the metal would be stayed. As it is, many of the metals largely used for articles likely to be exposed to ordinary oxidizing influences depend, for their adaptability to such purposes, on the film of oxide which forms on their surfaces and so protects them from further action. We see this fact well exemplified in the case of lead and zinc.

Iron, however, presents the difficulty, already referred to, of being susceptible of progressive rusting, in the case of the red oxide which forms on its surface if exposed, at the ordinary temperatures, to the influences of moisture and atmospheric oxygen. If, however, we come to examine the matter a little more closely, we find that there is an oxide of iron known to chemists as the magnetic or ferrosoferric oxide that is unalterable, and requires an elevated temperature to produce it.

This oxide, then, seems at once to solve the difficulty, and, as a matter of fact, the Russians, as pointed out by Dr. Percy, in his interesting paper before the Iron and Steel Institute, have been using this very substance for many years as a protective from further oxidation. The coating they form, however, is very superficial, and their method of procedure defective, and inapplicable to most articles.

It is well known to every beginner of chemistry that, if steam is passed over red-hot iron, the steam is decomposed, hydrogen being set free, whilst the oxygen goes to the iron to form the stable magnetic oxide of iron ($Fe_3 O_4$). On this reaction depends the process of Professor Barff, who, as is well known, places his articles in a heated chamber, and then passes in superheated steam for a time, dependent, of course, on the thickness of the film required. Mr. Bower has, however, discovered a process that will most efficiently coat the iron, and which immensely simplifies the whole method of procedure. The agent he employs is the oxygen of the atmosphere around, and the entire process is a marvel of simplicity. The articles are simply placed in a chamber constructed of fire-brick or iron, and fitted with inlet and outlet pipes; air is passed in, and the chamber closed as completely as possible. The temperature is raised to the requisite degree, which varies with the nature of the articles, and ranges from a dull to a bright red heat. The chamber is kept closed for one hour, when the air is renewed and the chamber again closed, and in this way, at the end of every hour or so, a fresh supply of air is allowed to fill the chamber, until the required thickness of oxide is formed, which will, of course, depend on the ultimate use for which the articles are designed. The cost of thus protecting iron depends simply on the amount of fuel used, with labour and wear and tear of apparatus involved, so that the process has the advantage of being literally the cheapest, as well as the most effective, yet brought before the public.

The air supply may be derived either from an ordinary gasholder, or by connecting the outlet-pipe with the draught of the chimney-shaft, in connection with the furnace heating the chamber.

The coating has been most severely tested, both as to hardness, homogeneity, and capability of withstanding all the ordinary oxidizing influences likely to be brought to bear on it, and has not been found wanting, but has received the highest eulogium from those who have had an opportunity of testing the process.

The colour of the coating produced being of a peculiarly delicate tint, and varying between a light and a dark grey, or neutral tint, absolutely dispenses in a large number of cases with the use of further ornamentation by painting, &c. The process deserves especial encouragement, when it is recollected how enormously it must enhance the value of iron as a constructive material, and also facilitate its application under circumstances which at present forbid its use.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

SALES OF GAS ACTS, 1859 & 1860.

SIR,—A short time since I promised to make some further communication about these Acts, and now, if you will kindly permit me, I will redeem my promise.

The Act of 1859 provides as follows:—

"That after the passing of the Act the only legal standard or unit of measure for the sale of gas by meter shall be the cubic foot, containing 62·321 lbs., avoirdupois weight, of distilled or rain water, weighed in air, at the temperature of 62° of Fahrenheit's thermometer, the barometer being at 30 inches.

"That within three months after the passing of the Act, models of gasholders measuring such cubic foot, and the multiples and decimal parts thereof, with proper balances, indices, and apparatus for testing the measurement and registration of meters, together with stamps of a uniform design for stamping the same, shall be made and verified under the direction of the Lord High Treasurer, and be deposited with the Comptroller-General of Her Majesty's Exchequer, at Westminster, the Lord Mayor of London, and the Chief Magistrates of Edinburgh and Dublin, and with the Chief Magistrates of such other cities and boroughs as the said Lord High Treasurer shall direct.

"That within nine months, certain Local Authorities (hereafter named) shall provide copies of the said gasholders, apparatus, &c., for testing meters, with stamps for stamping the same, and shall appoint a sufficient number of Inspectors, and allot to each Inspector a separate district for carrying into effect the provisions of the Act."

These authorities are—

"For England: The Justices of the Peace, in quarter sessions assembled, of every county, riding, division, county of a city, or county of a town, and the Town Council of any borough, if within six months they decide, in manner prescribed, to adopt the Act.

"For Scotland: The Justices of the Peace, at a meeting to be called for the purpose by the Sheriff of each county, and the Magistrates of each royal burgh; but the Justices and Magistrates may unite and form one district for the whole county.

"For Ireland: The Town Council or Town Commissioners of every borough and town, and where any gas district extends beyond the district of such town or borough, the Town Council or Town Commissioners are to put the Act in operation over all parts of the gas district.

"In all towns and boroughs where the Town Council or Town Commissioners are manufacturers and sellers of gas, the Act is to be put into operation by the Justices of the Peace or Grand Jury, as the case may be, instead of by the Town Council or Town Commissioners.

It is provided—

"That nothing in the Act shall extend *to compel* any Town Council in England, or royal burgh in Scotland, except such as are county towns, wherein gas is used, to provide copies of the said gasholders, apparatus, &c.

"That no meter duly stamped under the Authority of the Act shall be liable to be re-stamped, although the same be used in any other place than that at which the same was originally stamped.

"That after twelve months, *no meter shall be fixed* for use unless the same shall have been stamped by an Inspector appointed under the provisions of the Act.

"That after the expiration of ten years, *no meter shall be used* for measuring gas unless the same shall have been stamped as aforesaid.

"That any person, upon conviction, shall forfeit a sum not exceeding £5 for fixing any unstamped meter for use after twelve months as aforesaid, or for using any unstamped meter after ten years as aforesaid, and that *any contract, bargain, or sale made by any unstamped meter, after the ten years, shall be void.*"

It was, therefore, as respects England and Scotland, made obligatory upon every county, riding, division, county of a city, or county of a town, "to put the Act in operation;" but left optional for towns not being county towns to do so or not as they saw fit; but, as counties included all places that did not "put the Act in operation" for themselves, it followed that, whether towns did so or not, the Act was in effect obligatory upon all places in England and Scotland; and, as respects Ireland, it was obligatory upon all towns and boroughs to adopt it, and power was given to them to extend to places adjoining, but no power was given to the counties, either permissive or otherwise.

When the Act was passed the verification of the gasholders, apparatus, &c., for proving the meters was placed under the direction of the Astronomer Royal, and so much time was occupied in making them of the degree of precision which he thought necessary, that it was found impossible to put the Act in operation by the time named; hence it became necessary to have another Act in the following session to alter the date, and when that was introduced the following provision, for the reasons hereafter explained, was inserted:—

"That, notwithstanding anything in the said Act contained, *the said Act shall not come into operation*, in any county of England, until the Magistrates of such county, in quarter sessions, or in any county in Scotland until the Commissioners of Supply of such county, or in any county of *Ireland* until the Grand Jury of such county, shall have resolved to bring such county under the operations of the Act."

The object of the original Act was undoubtedly to prohibit the use, after a given time, of any meters for the sale of gas that had not been stamped, and as the promoters said that every meter had to be taken down for repair in the course of every eight or ten years, the period of ten years was fixed upon, that the change might be made without any additional expense to the company, or inconvenience to the consumer.

The provisions for putting the Act of 1859 in operation were the best that could have been made for that purpose; but, nevertheless, they would, in their own way, have carried out the object of the Act; and if that had never been altered, the supplying of gas through an unstamped meter would at the present time have been illegal in all parts of England and Scotland; but, by repealing the obligation upon the counties to adopt the Act, it has become illegal in some places and not in others, and the public have no direct means of knowing where it is illegal, and where it is not.

Under the powers of the Act, a county could only put it in operation to the extent of its own jurisdiction, and a city or town could do no more; consequently, if a city or town were to adopt it, and the county in which such city or town was situate were not to do so, one part of the county would be subject to the Act, and not the other part; and a gas district, whether supplied by a Company or a Local Authority, might be subject to the Act in one part, and not so in the other. The same thing would also occur if one county adopted the Act and not the adjoining county. Gas districts, as a rule, have no relation to either county or municipal limits.

As by the original Act the counties in England and Scotland were obliged to adopt the Act, and the counties included all places that were not otherwise provided for, the power conferred upon the towns and boroughs of Ireland to extend the Act, in certain cases, to places beyond their own limits, was not required for the cities and towns of England and Scotland; but when the counties of England and Scotland were relieved of the obligation to adopt the Act, the cities and towns in England and Scotland were placed in precisely the same position as the towns and boroughs of Ireland, and, to make the Act effective, should have had the same powers.

In the absence of any provision to that effect, or for authorizing the counties and cities to unite and form one district, as in Scotland, places lying beyond the statutory limits of any city or town are, if the counties do not resolve to put the Act in operation, left wholly unprotected, although they may be, to all intents and purposes, part of such cities or towns. Neither the Act of 1859 nor 1860 contains any express provision as to how the public are to know whether the County Justices have resolved to bring the county under the operation of the Act or not. The Act of 1859 provides that the Justices of the Peace for the county, in quarter sessions assembled, shall, within nine months after the passing of the Act, do the following things, viz.:—

"Provide copies of the models of gasholders, apparatus, &c., for testing the meters, and stamps for stamping the same.

"Fix the places at which such models and stamps shall be deposited.

"Appoint a sufficient number of Inspectors of Meters for the safe custody of such copies and stamps, and for the discharging of the other duties imposed by the Act.

"Allot to each Inspector a separate district, and distinguish each such district by a number or mark, and have that number or mark affixed to the stamp."

If the Justices of the Peace for the county have not done these things, it may be concluded that they have not resolved "to bring the county under the operation of the Act," and accordingly that the Act does not apply to any part of that county outside the statutory limits of any city or borough that may have adopted it for its own district.

While the Act was passing, the public took but very little interest in it. Many of the Justices in the counties knew nothing about it until the time came for putting it in operation, and then some of them—especially those in the rural districts—objected to doing so on account of the expense, and raised a great outcry in opposition. They represented to the authorities that, as nearly all the stamping would have to be done in the cities and towns, it was only in those places that the fees for stamping could have any chance of covering the expenses, and as it was only the inhabitants of such places who could be benefited by the Act, they ought to bear the expense of putting the Act in operation themselves. And further, that if the counties adopted the Act, they could not prevent the cities and towns from doing so too, if so disposed; and thus, after incurring a large expense, they might be left with only the outside places, where there might be but very little gas used, or perhaps none at all to provide for. That under such circumstances, it would be very unjust to the counties to compel them to adopt the Act, and they ought to be allowed a discretion to adopt it or not, as they saw fit.

These arguments, it may be presumed, had some influence with the authorities, as, when the Act for altering the date was introduced, the obligation upon the counties was repealed, and a discretionary power conferred upon them instead.

It was no more than just to the counties, under the circumstances, to relieve them from the very unsatisfactory position in which the Act had placed them, but the relief was given in the wrong way.

All cities and towns are large consumers of gas, and even when the Act was first brought in, many of them were "manufacturers and sellers of gas," while it was certain that many more would become so year by year, whereas counties never could become "manufacturers and sellers of gas" or, to any large extent, consumers.

The amending Act, therefore, ought to have repealed the powers conferred upon the cities and towns, and not those upon the counties Had the counties been made, as they ought to have been, the sole authorities for putting the Act into operation, instead of the cities and towns, as prescribed by the Act, with power to form districts among themselves, as in the Highways Act, they would doubtless have selected the most suitable localities for the purpose, and have prevented much unnecessary expenditure, by avoiding the useless multiplication of places, and thereby have made the fees cover a very large portion, if not the whole, of the working expenses. And what, perhaps, is of more importance than anything else—the testing and stamping of meters—would then have been, as they ought to be, under the control of independent parties, as between the buyer and seller, and not, as they now too often are, entirely in the hands of the seller.

In the Metropolis, which is frequently referred to as a guide in these matters, the Vestries and Local Boards are the consumers of gas, but the Metropolitan Board of Works—an entirely different body—have charge of the proving and stamping of meters.

When the original Act was first drawn, the promoters had no knowledge, and no means of acquiring knowledge, as to what the necessities of the case were likely to be; but now, when the Act has been in operation for 15 years, very accurate information can be obtained by the authorities as to what the necessities of the case really are, and the whole machinery might be re-arranged so as to make certain that the fees in all cases covered the expenses.

Meter makers have all their meters, whether new or repaired, stamped before they send them in to the companies, and must of necessity do so; and, for their own convenience, they send them to the testing-place nearest their own premises. Probably there are many more meters made in London than in all the other parts of the country together—England, Scotland, and Ireland—and, doubtless, all those made in London are stamped in London, although they may be used in all parts of the country. It might, therefore, be that, while a testing-place in the Metropolis was a source of large profit, those in many country places were heavy losses. But I have no knowledge of the facts, and cannot, therefore, say for certain how the facts really are. It is, however, abundantly evident that the work done at a testing-place is not governed by the number of inhabitants of the district, but by the accident, as it were, of a meter maker in large business being located in the neighbourhood.

Some companies repair their own meters, and would, no doubt, like to have a testing-place close at hand; but, if companies choose to take upon themselves the business of meter makers, they must do so with all its attendant casualties, as there is no reason why they should have any advantages over others engaged in the same occupation.

Every gas company, whether under statutory powers or not, ought to be compelled to have a model gasholder apparatus, &c., on their own premises, and all cases of disputed registration ought to be tried there first, in the presence of the consumer himself, or any one whom he may depute to represent him, but subject to the right of either party to appeal to the nearest testing-place, on condition of paying the cost in the event of the final decision being given against him.

All the work, therefore, that need be done at a testing-place is the proving and stamping of new or repaired meters. Occasionally there might be an examination for a disputed registration, as before explained; but even with this, it is evident that, with the present railway accommodation, a very few places would suffice for this work.

Any large town, on the borders of a county having a testing-place, might act for the district all round, irrespective of county boundaries.

The Act is full of very serious defects, so much so that any attempt to amend it would only make matters worse; it ought to be wholly repealed, and another, with an entirely new set of regulations, passed instead; and the new Act ought to contain a clause to prohibit absolutely the use of unstamped meters either in England, Scotland, or Ireland, which might be done without injustice to any one.

W. Livesey.

Gas and Water Companies Association, 6, Victoria Street, Westminster, June 19, 1878.

BIRMINGHAM GAS APPARATUS EXHIBITION.

Sir,—Below I send you particulars of admissions at the Gas Apparatus Exhibition, recently held in Birmingham, which I hope may be useful to others who propose to organize such Exhibitions:—

Exhibition.		Admission.	
Wednesday	2 to 5 p.m.	2s. 6d.	333
Do.	5 to 10 p.m.	1s.	751
Thursday	11 a.m. to 5 p.m.		
Do.	5 to 10 p.m.		
Friday			
Saturday			
Monday	11 a.m. to 5 p.m.	6d.	4,852
Wednesday			
Thursday			
Friday			
Saturday	5 to 10 p.m.		
Monday			
Tuesday	11 a.m. to 5 p.m.	3d.	10,703
Wednesday	5 to 10 p.m.		
Thursday			
Total			16,639

Cooking Lessons.	
High-class cooking, five lessons, admission 6d.	256
Plain household cooking, six lessons, free	897
Artizan cooking, ten lessons, free	3,233
Total	4,386

Edwin Smith, Secretary.

Corporation Gas Department.
Offices: Old Square, Birmingham, June 21, 1878.

STAFFORD GAS-WORKS PURCHASE.

Sir,—Your Journal of the 18th inst. contains the information that the Stafford Gas Company have sold their concern to the Corporation for £70,000, and have left the question of recompense to the Manager, for loss of office, to the tender mercies of the Shareholders, who may, or may not, "privately raise a testimonial."

It would interest some of your readers to know why Stafford does not come under the operation of clause 309 of the Public Health Act, 1875.

The spirit of that clause certainly infers that a fair compensation is due to the ex-Manager, but if the "letter of the law" does not give it, I respectfully submit to the consideration of our legislators that the law should be amended.

A Country Manager.

[The compensation provided for under section 309 of the Public Health Act is clearly not intended for officers of a Gas Company displaced by the transference of the undertaking to the Local Authority, but for public officers serving under superseded local Acts. The misfortune at Stafford is that, by section 51 of the Stafford Corporation Act, 1876, the Gas Company are made trustees for the purchase-money received for the sale of their works, to distribute the whole of it among the Shareholders, and they have no power to appropriate one shilling in the way of compensations. Seeing, however, that the Shareholders will thus receive sums equal to 29¼ years purchase of statutory dividends, it will be very ungracious on their part if they do not willingly and promptly contribute the amount which the Directors, in the first instance, proposed to set aside for this purpose.—Ed. J. G. L.]

SEWAGE GAS.

Sir,—I find on reading over my letter in your Journal, on sewage gas from "Wrexham sewage sludge," that there is an error in the quantities of gas per ton.

I should be obliged if you will correct the same as follows:—

Purified gas, per ton . . . . . 4669 cubic feet.
Unpurified gas, per ton . . . . . 5696 "

You will see that a decimal point had been introduced.

T. A. Collingе, Analyst.

Rochdale, Corporation Gas-Works, June 22, 1878.

[On examination we find that the error was in our Correspondent's copy.—Ed. J. G. L.]

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, June 17.

The following Bills received the Royal Assent:—Gas and Water Orders Confirmation; Local Government Provisional Orders (Droitwich, &c.); Bedlington Local Board Water; Burton-upon-Trent Commissioners Gas; Clitheroe Gas, Water, and Improvement; Cockermouth and Workington Water; Dalton-in-Furness Local Board; East Grinstead Gas and Water; Hemel Hempsted District Gas; Nottingham Improvement (Gas, &c.); Scarborough Corporation Water; South Hants Water; Southport Water; Tredegar Water and Gas; West Houghton Local Board.

Bradford Water and Improvement Bill,—read the third time, with the amendments, and passed.

Stoke-upon-Trent Corporation Gas Bill,—read the third time, with the amendment, and passed.

Tuesday, June 18.

Cardiff Water Bill,—reported with an amendment.

Drumcondra, Clonliffe, and Glasnevin Township Bill,—read a second time, and committed.

Newry Gas Bill,—Commons amendments considered, and agreed to.

THURSDAY, JUNE 20.

Maryport Improvement Bill,—reported with amendments.

Hamilton Burgh Bill,—read the third time, with the amendments, and passed.

FRIDAY, JUNE 21.

Limerick Corporation Gas Bill,—reported with amendments.

Grand Junction Water Bill,—reported without amendment.

Cardiff Water Bill,—read the third time, with the amendment, and passed.

Cheltenham Corporation Water Bill,—referred to a Select Committee, consisting of Earl Powis (Chairman), Lord Carysfort, Lord Heytesbury, Lord Truro, and Lord Norton; to meet on Monday, June 24.

PUBLIC HEALTH ACT (1875) AMENDMENT BILL.

On the report of amendments to this Bill,

Earl DE LA WARR announced that when the third reading came on, he would take the opinion of the House on the measure.

The Earl of KIMBERLEY said he should propose the third reading on Tuesday, June 25.

After some verbal amendments, the report was received.

HOUSE OF COMMONS.

MONDAY, JUNE 17.

Newry Gas Bill (Lords),—read the third time and passed, with amendments.

TUESDAY, JUNE 18.

South Staffordshire Water Bill (Lords),—reported with amendments.

Exeter Gas, Castleford and Whitwood Gas, Normanton Gas, Forfar Water, and Warrington Water Bills (Lords),—referred to a Select Committee, consisting of Mr. Stansfield (Chairman), Mr. Simonds, Mr. Wethered, and Mr. Swanston; to meet on Tuesday, June 25.

THURSDAY, JUNE 20.

The Examiners reported that the Standing Orders not previously inquired into have been complied with in the case of the Mansfield Commissioners Gas Bill (Lords).

Leicester Corporation Bill (Lords),—as amended, considered; amendments made.

FRIDAY, JUNE 21.

Stoke-upon-Trent Corporation Gas Bill.—Lords amendments agreed to.

Lichfield Gas Bill (Lords),—as amended, considered; clause added; amendments made.

Trowbridge Water Bill (Lords), as amended, considered.

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

WEDNESDAY, JUNE 19.

(*Sittings in Banco before the* LORD CHIEF JUSTICE *and Justices* MELLOR *and* LUSH.)

THE QUEEN, ON THE PROSECUTION OF THE BOARD OF WORKS FOR THE WANDSWORTH DISTRICT, *v.* WALLACE.

Mr. MORGAN HOWARD, Q.C., and Mr. F. J. SMITH were for the prosecution; Mr. GRANTHAM, Q.C., and Mr. WALLACE for the defendants.

In this case the defendants, who are the proprietors of the chemical works at Battersea, were indicted at the Surrey Assizes, in 1877, before Justice Grove, for a nuisance created by them in the manufacture of sulphate of ammonia and sulphuric acid. The Jury, however, were unable to agree, and were therefore discharged. The case was tried again at the last Spring Assizes at Kingston, before Lord Coleridge (see JOURNAL, Vol. xxxi., page 555), when the defendants pleaded guilty, it not being denied that, as the works had been conducted, there had been a nuisance, the defence being that, by certain changes in the process, the nuisance had been abated. The complaint originally made against them was that, in carrying out their operations, they used sulphur and the refuse liquids obtained from gas-works, and it was represented that the fluids and gases evolved in the works were not only offensive, but noxious and injurious to health. It was stated that the liquid discharged into the sewers was so noxious as to cause the death of one of the men engaged in the sewers, and that the gases which escaped from the sewers injured the health of the inhabitants. At the last sittings of the Court the plaintiffs prayed for judgment, whereupon the defendants applied for leave to file affidavits showing that the nuisance had been abated. The application was opposed on the ground that the nuisance was so great, and the necessity for repressing it so urgent, that no delay ought to be allowed. Upon this one of the Masters of the Court (Master Brewer) was sent down to inspect the premises, and he reported to the Court that, at all events as the works were then conducted, there was no such serious nuisance as was described, and no such urgent necessity for a remedy. Upon this the case was postponed to allow time to the defendants to file affidavits showing that the nuisance had been abated by the means which had been adopted, and a large number of such affidavits had accordingly been filed, and there was an equally large number on the other side to show that the nuisance had not been abated, but still existed. The question upon these affidavits was whether the means adopted since the prosecution was instituted had or had not in substance abated the nuisance, and upon that question the affidavits were contradictory and equally numerous on both sides.

On the present occasion the prosecution again moved for judgment, and numerous affidavits were read in support of the motion, and in mitigation. On the part of the prosecution there were 37 affidavits, representing 76 deponents, several of them joining in the same affidavits. Of these, six were medical men in the neighbourhood, two were chemists of eminence—Mr. Keates and Mr. Dupré—and the rest were inhabitants of the neighbourhood. On the part of the defence there were 45 affidavits, representing 82 deponents, of whom six were medical men in the neighbourhood, three were chemists of eminence—Dr. Voelcker, Dr. Wright, and Mr. Manning—and the remainder were inhabitants of the neighbourhood. Some of the medical men had made depositions on both sides, having originally given evidence at the first trial on behalf of the prosecution to show that the works as they had been carried on were a nuisance, and having since then made affidavits on behalf of the defendants to show that the nuisance had been abated by the means which had since been adopted. These means were fully described in the affidavits for the defence; but they applied, it should be observed, only to the manufacture of sulphate of ammonia, not to the manufacture of sulphuric acid. The affidavits for the prosecution, however, applied to both manufactures, though that of the sulphate of ammonia, made from the ammoniacal liquor, appeared to be the worse. The affidavits stated that sulphuric acid was made from sulphur, the effluvium from which resembled that by the burning of a great quantity of lucifer matches, and produced choking sensations in the throat, tending to cause inflammation of the eyes, inflammation of the mucous membrane of the throat, ulceration in the throat, &c. In the manufacture of sulphate of ammonia it was stated that quantities of ammoniacal liquids at high temperature—very often as high as 170° or 180°—were discharged into the sewers, whence arose "clouds of steam," charged with sewer gas, and not only abominably offensive, but most injurious to health. One witness stated that a silver watch he had was quite blackened, and there were affidavits to show that the men in the sewers could not exist, and one of them had, as already stated, actually been killed in the sewers. The smell, it was said, was that of "sulphuretted hydrogen," which was like that of a great quantity of rotten eggs, and it was described as abominably offensive. Filthy smells, it was said, pervaded the whole neighbourhood and produced such nausea that the inhabitants were obliged to keep their windows closed, and this even on Sundays, thus depriving their houses of ventilation; and even in the churches the windows had to be closed. Moreover, medical men stated that, to their knowledge, the health of the inhabitants was affected, and they gave instances of illness caused by the nuisance. These affidavits, it should be stated, applied not only to the period between the prosecution and the trial, but from the trial in March last down to the last month, the month of May, and even down to the present month. In the course of the reading of the affidavits for the prosecution, the medical men stating cases of actual illness caused by the nuisance,

The LORD CHIEF JUSTICE interposed, and asked: What possible answer can be made to these affidavits? There are instances of actual illness caused by the nuisance; and if that be so, it is utterly impossible to justify the nuisance.

Mr. GRANTHAM said that he had as many affidavits on the other side.

The LORD CHIEF JUSTICE: Affidavits of persons who have not smelt the nuisance which the others have smelt. From my own chemical knowledge, I should say that you cannot manufacture these things without producing these noxious fumes.

Mr. GRANTHAM: That is true.

The LORD CHIEF JUSTICE: Then, how can you get rid of the fumes?

Mr. GRANTHAM: That is the difficulty, no doubt; but we say that the means we have adopted have done away with the nuisance—by means of sealed pipes and tanks, and passing the liquid through charcoal. The ammoniacal liquor, the refuse of the gas-works, must be got rid of somehow. The defendants take 17,000 gallons of it a day from one company's gas-works, and 17,000 gallons a day from another, and, no doubt, the liquor evolves offensive effluvia; but every means have been adopted to neutralize them. The defendants have offered to conduct their works under the inspection of the Medical Officers of the Board of Works.

The LORD CHIEF JUSTICE: That is, on the supposition that the works can be conducted so as to avoid a nuisance.

Mr. GRANTHAM: No doubt; but the defendants have done all they can, and have spent £6000 in a few months. The affidavits on their part show that the means adopted have done away with the nuisance.

The LORD CHIEF JUSTICE: Mr. Morgan Howard, are you satisfied, on the part of the prosecution, that the nuisance has been abated?

Mr. HOWARD: Certainly not, my lord; on the contrary, our affidavits show that the nuisance is as great as ever, and one of the affidavits, made by the Curate of the parish, was made the day before yesterday.

Justice LUSH: It is for the defendants to satisfy us that the nuisance has been abated.

Mr. GRANTHAM: No doubt; and we say that our affidavits are sufficient to satisfy the Court of it, and they are in accordance with the Master's report.

Justice LUSH observed that it might be that, on a particular occasion, at a particular time, the nuisance might not have been observable.

Mr. HOWARD said the defendants knew or suspected that some one was coming down, and, no doubt, put a stop to the works. There were 250,000 gallons of this foul liquor to be disposed of at these works every week, and it stood to reason that they could not be disposed of without causing the nuisance. The last suggestion was that the liquor should be absorbed in the earth, thus infecting all the wells and springs of the neighbourhood.

The LORD CHIEF JUSTICE: The truth is, that the works ought not to be carried on in such a place in the midst of a populous neighbourhood. How do the defendants say that they have altered their process?

Mr. GRANTHAM: By cooling the effluent liquor, and absorbing the effluvia.

Mr. HOWARD said, at the first trial, Justice Grove pointed out that although chemists in their laboratories might, on a small scale, carry out processes which neutralized effluvia, such processes could not be carried out effectively by common workmen, on a large scale, in extensive works.

The LORD CHIEF JUSTICE: If you generate sulphuretted hydrogen, it must escape somewhere.

Mr. GRANTHAM: Unless it is consumed, and we say our affidavits show that it is consumed.

Mr. HOWARD stated that upwards of 1000 of the inhabitants had memorialized the Board against the works.

Mr. GRANTHAM read some of the affidavits for the defendants to show that under the existing process the temperature of the effluent liquor was nearly 100° less than before—that is, 88° instead of 180°, and that there was nothing in the effluvia detrimental to vegetation or health.

Mr. HOWARD pointed out that the chemical witnesses showed that sulphuretted hydrogen was not inimical to vegetable, but to animal life, and it was the sulphuric acid which was injurious to both animal and vegetable life; and the chemical witnesses for the defence did not deal with the sulphuric acid. Moreover, there were affidavits of witnesses who were at the works in June, showing that the nuisance was as great as ever it was.

Justice MELLOR observed that if there was such difficulty in preventing the nuisance, that only showed that the works ought not to be carried on in such a neighbourhood. The law was now settled that it was not a defence to a charge of nuisance that the inhabitants had come to the neighbourhood; they were equally entitled to enforce the law against it.

Mr. GRANTHAM again urged that the improvements his clients had made had been successful in obviating all nuisance.

Justice MELLOR: When were they completed?

Mr. GRANTHAM: In April.

The LORD CHIEF JUSTICE: How far do the affidavits for the prosecution bring down the existence of the nuisance?

Mr. HOWARD: To the day before yesterday. There were three affidavits on Friday last, and one the day before yesterday. One of the medical witnesses states that sulphuretted hydrogen is a poisonous gas, and even when diluted with air causes sickness. The other affidavits trace the nuisance down to the end of May in an abominable and aggravated form; and then there are these additional affidavits within the last few days. The Board have given the defendants every possible delay in order to allow them, if they could, to abate the nuisance, and it still exists in as bad a form as ever. The affidavits show that the nuisance exists by night and by day—on Sundays as well as on week days.

Mr. GRANTHAM, on the other side, urged that the measures adopted by the defendants had been completely successful.

The learned Judges having conferred together,

The Lord Chief Justice said: We are not quite satisfied as to whether this nuisance, which undoubtedly was of a most serious character, has been or has not been abated. One thing is quite clear, that the nuisance was one which called for prosecution; and the propriety of the prosecution has, indeed, been admitted by the defendants, who have pleaded guilty. It is clear, therefore, that they must pay the costs of the prosecution; and we see no reason for delaying the payment of those costs, and we think that the payment of them ought to be a condition precedent for any further indulgence we may be disposed to afford them. Not being quite satisfied as to whether the nuisance has or has not been abated, we are disposed to give them some further time to try experiments, with a view of preventing the continuance of the nuisance. Let the case, therefore, stand over until the next sittings in November, but with this understanding, that though the sittings here will, before long, terminate, the Judges having to go the Circuits, there will be a Court from time to time, and one of the members will be my brother Mellor, who is in full possession of the facts of the case; and if the nuisance is found still to continue to so serious an extent as to call for the further interposition of the Court in the form of a final judgment, an application may be made to the Court for judgment; and the defendants must take this warning, for we are thoroughly sensible of the serious and offensive character of the nuisance, as it has heretofore existed, and we are determined to use the full power of the Court to suppress it, if it cannot be so altered in character by the defendants as to cease to be a nuisance to the inhabitants. Let the case, then, on that understanding, stand over till November.

COMMON PLEAS DIVISION.—Saturday, June 22.

(*Before Justices* Grove *and* Lindley.)

WALKER *v.* THE GASLIGHT AND COKE COMPANY.

Mr. Willoughby and Mr. Crispe appeared for the plaintiff; Mr. Willis, Q.C., and Mr. Paine for the defendants.

The plaintiff in this case was a labourer who last year was in the employ of a firm of contractors who were engaged in constructing a steam lift at the works of the defendants at Bromley-by-Bow. Whilst the plaintiff, on the 16th of July, was stooping down, a derrick belonging to the defendants fell across the rope of another derrick, and this last-mentioned derrick struck some heavy planks three inches thick, and one of them fell from a height of twenty feet upon the plaintiff, and struck him on the back of the neck. He received a number of injuries, the most serious of them being, according to his case, a partial dislocation of the vertebræ, accompanied with all the distressing symptoms likely to follow from such a hurt. One result was that the plaintiff's head was twisted round rearways, and there was also paralysis. He was attended by various medical men, he was in the hospital for a considerable time, and he was watched both when awake and when asleep. Medical tests were applied to see whether there really was paralysis. The medical evidence for the plaintiff was that the symptoms exhibited were all real, whilst the medical men on the other side believed he was shamming. The trial took place before Justice Manisty at Chelmsford, and the Jury found a verdict for the plaintiff, damages £1050. Subsequently his lordship expressed himself as satisfied with the verdict. This Court, however, granted a rule to show cause why there should not be a new trial upon the grounds that the verdict was against the weight of evidence, and that the damages were excessive; and more expecially upon some affidavits which stated that soon after the verdict the plaintiff was seen walking about apparently in good health, most of the symptoms from which he had previously suffered having very quickly disappeared. Affidavits were now produced on behalf of the plaintiff. Three medical men stated that they had examined him recently, and found the symptoms existing as they were before the trial. It was feared that the injuries would be permanent. There were two other affidavits by persons who knew the plaintiff, and they confirmed the statements of the medical men to some extent. Upon the question whether the damages were excessive, it was stated on one side that the plaintiff's income was 30s. a week, and on the other side 25s., or less. The defendant's counsel contended that the damages must be held to be excessive because the Jury had awarded the plaintiff about 17 years full income. On the other side it was said that, taking into account the plaintiff's sufferings, and the state to which he was reduced, the amount could not be said to be too much.

Justice Grove, at the close of the arguments, said the Court would make an order in the following terms:—They directed a new trial for the re-assessment of damages only (the question of negligence being taken as proved) on the defendants paying, within ten days, to the plaintiff £100, and £50 to his solicitor on account of costs, the further costs of both trials and the rule being in the discretion of the Judge at the second trial.

Rule absolute for a new trial.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

Major Bolton reports that the state of the water in the Thames and Lea was clear up to the 11th of May, after which it was very turbid and much discoloured, and remained in a bad condition during the remainder of the month. In the Thames, at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated), the water was indifferent on the 1st, when it slightly improved and became clear; it remained in a good condition up to the 11th, on which date floods prevailed, and from that time until the end of the month it was in a turbid condition. The highest flood state of the river at Hampton during the month was 1 foot 3 inches above summer level, and the lowest 3 inches below the summer level. The Thames was in a state of flood for the latter half of the month. The West Middlesex Company have been called upon by the Thames Conservancy to lower a portion of their 36-inch conduit under the bed of the river between Barnes and Hammersmith, which was laid in 1836, to allow of the bed of the river being dredged. The important work of lowering this conduit is now proceeding.

PLYMOUTH AND STONEHOUSE GAS COMPANY.

The Annual Meeting of the Shareholders was held at the Works on Thursday, the 20th inst.—Mr. J. Wills in the chair.

The report of the Directors stated that the affairs of the Company were in a very satisfactory condition, a considerable increase in the consumption of gas having taken place during the past year. After payment in January last of the authorized half-yearly dividend, and making provision for outstanding debts, there remained a disposable balance of £6715 15s. The Directors recommended the payment out of this sum of a further dividend of 10s. per share on the original shares, 7s. 6d. per share on the additional shares, and 3s. 9d., per share on the new additional shares, and that the remaining balance of £3215 15s. be carried forward to the credit of next year's account. The price of gas to private consumers was reduced to 2s. 3d. per 1000 feet, and the public lamps to £2 14s. per annum, from Lady-day last. The Directors, with a view of meeting the increasing demand for gas, had made contracts for the erection of a new retort-house. Larger pipes had also been ordered, to replace the present main from the Crescent to Durnford Street, which would afford a better supply to the consumers of Stonehouse generally. After alluding to the death of their late Chairman, Mr. Adams, the report stated that Mr. George Henderson, who had filled the office of Secretary from the formation of the Company, retired at Lady-day last. The Directors considered it unnecessary to remind the Shareholders of the important services rendered by Mr. Henderson in the exemplary discharge of his duties during this long period of 34 years. These services merited, in the opinion of the Directors, a substantial acknowledgment from the proprietary, and they had unanimously agreed to a resolution that an annuity of £400 be granted to Mr. Henderson during his life. The Directors also reported that they had elected Mr. Henderson a Director, in the place of the late Mr. Adams, whereby the Company would continue to receive the benefit of his great experience and matured judgment. Mr. John Thomas, who had been upwards of 20 years in the service of the Company, had been appointed Secretary.

The Chairman moved the adoption of the report, and in doing so stated that during the past year there had been a larger increase in the consumption of gas than in any previous year. The Directors were fully alive to the importance of extending their plant to meet the increasing demands and the requirements of the public. Consequently they had now in course of erection a large retort-house, and they were about to lay down a large main, which would afford a better supply of gas both for Plymouth and Stonehouse. When these improvements were carried out he thought they would hear very few, if any, complaints as to the supply of gas in the Company's district.

Mr. King seconded the motion, which was carried unanimously.

The Chairman then moved—"That, in consideration of the important services rendered to the Company by Mr. George Henderson, the late Secretary, an annuity of £400, to be paid quarterly, be allowed him from Lady-day last, when he retired, to the end of his life." He warmly eulogized Mr. Henderson for the manner in which he had discharged his duties. In 1844, he said, Mr. Henderson projected the Gas Company. The supply was then inadequate, impure, and injurious to health. Then the price charged those who by favour had a meter was 9s. per 1000, and it was reckoned that those who paid by the light paid 16s. per 1000. At that time Mr. Henderson canvassed the three towns, and got the present Company together. Great difficulties were then experienced in many ways, one being in regard to money. Mr. Henderson placed a large sum of money at the credit of the Company to carry out operations when by Act of Parliament they could not raise the amount required. Therefore he considered the Company were under very deep obligations to Mr. Henderson. The price of gas now was 2s. 3d. per 1000, the lowest in the kingdom; and, besides this, he thought he was justified in saying they could challenge the kingdom as to the purity of their gas. The £10 shares were now selling at £24 each, and other shares in proportion, which showed a considerable advance in the value of their property. He might tell the meeting that in dividends the proprietors had received no less a sum than £139,579. That sum had circulated mostly throughout Plymouth and Stonehouse, and must have been productive of good to the people at large. He contended that the present satisfactory position of the Company was due in a great measure to Mr. Henderson.

Mr. Ellis seconded the motion, remarking that the services rendered by Mr. Henderson had been so valuable that he would have been glad if it had been proposed to give him £500 a year.

Mr. Chase said he could not agree with Mr. Ellis in this matter, because he thought all public companies should be careful how they established precedents. Still, Mr. Henderson had been an exceedingly valuable servant, and he hoped the Company would reward him for the amount of time and attention he had given to the work. Whilst extolling Mr. Henderson, however, he thought they ought to remember that Mr. Browning (the Engineer) was entitled to some consideration and eulogy. He thought the thanks of the consumers were really due to that gentleman, because the price of gas was so low.

Mr. Lansdown supported the resolution, and said he had no doubt that when the time came the other officers would be spoken of as Mr. Henderson had been.

Mr. Hawke said he was the representative of the consumers in this matter, and they, he said, would be taxed or surcharged ¼d. per 1000 feet to meet the proposed annuity. £400 a year was a very large sum to grant for life, and he argued that possibly something would be invented to supersede gas, as gas had superseded something else; and, therefore, he was afraid the proposers had scarcely contemplated their position, and he also submitted that the Company had not had the entire services of Mr. Henderson. He had earned money in various other ways—*i.e.*, as Auditor of the South Devon Railway Company, also in connection with the Launceston Gas-Works, and by giving professional evidence in Parliament.

The Chairman thought they ought to be thankful that Mr. Henderson was competent to give evidence in the House of Commons.

Mr. Hawke said he would rather give Mr. Henderson a lump sum than grant him £400 a year for life, considering the circumstances that he had mentioned.

Mr. King, in reply to Mr. Chase, remarked that, in eulogizing the services of Mr. Henderson, it by no means followed that they depreciated the services rendered by the Engineer and the other Officers of the Company. He was surprised that Mr. Hawke, who was usually correct in a matter of this kind, was so far out of his reckoning when he said it would take ¼d. per 1000 to cover the annuity. Something like the fourth part of a farthing, with the present consumption, would be sufficient, and he did not think any one was likely to suffer from that.

Mr. H. Brown, Mr. I. Watts, and Mr. Woolland also supported the resolution, which, on being put to the meeting, was carried with but two dissentients.

Mr. Henderson, in returning thanks, said he had been 34 years connected with the Company, and during the whole of that period he had tried to do his best for the interests of the Shareholders. With regard to what Mr. Hawke had said, he came into the Company after it was firmly established, and was not therefore competent to express an opinion on the services he (the speaker) had rendered. Although retired from the secretaryship, it would be his duty and privilege to give the affairs of the Company that supervision he was accustomed to give in years past.

A motion that dividends be paid as recommended by the Directors in the report was carried unanimously.

The retiring Directors and Auditors were re-elected, and votes of thanks having been passed to the Chairman and Directors, the meeting closed.

Proposed New Association of Gas Managers.—We are happy to hear that it is proposed to form an Association of Gas Managers for the South-West of England, and a number of managers resident in the district met at Weymouth, on the 14th inst., for the purpose of making the necessary arrangements. It was decided to call a general meeting at Sherborne, on the second Tuesday in September, for the adoption of rules and appointment of officers. Mr. T. W. R. White, of Sherborne, is acting as secretary *pro tem.*

ROCHDALE CORPORATION GAS-WORKS.

The Annual Report of the Gas Committee of the Corporation of Rochdale states that, notwithstanding the reduction made in the price of gas last year (equivalent, in the aggregate, to over £4000 per annum) the Committee are pleased to state that, in consequence of more favourable coal contracts, and by a more careful supervision exercised over the manufacturing department, the profits during the past year are the largest that have ever been realized. After paying interest and 1-75th part of debt, and all other liabilities, the surplus profits amount to £8622 9s. 2½d.

The coke receipts are about the same this year as last. The per centage of coke sold was 37 per cent. of the material carbonized; last year being 33 per cent.

The Committee have not thought it wise, during the past winter, to work the hydraulic stoking machinery, in consequence of two-thirds of the retorts then in use being of a small size. Renewals are now being made, and when completed, all retorts will be of the size required for the successful working by machinery.

Considerable expense has been incurred during the year by the failure of one of the gasholder-tanks, which required considerable alterations to be made in the construction, in order to prevent the recurrence of a similar accident. The tank is now satisfactory, and all expenses connected therewith have been charged to revenue account.

The new governor-house and offices have been nearly completed, and the station-governors placed in position. The connecting-mains are now being laid. The respective governors will supply respective districts, and thus give a more perfect control over the total area of supply than has hitherto been attained.

It is the intention of the Committee, during this year, to replace the No. 1 station-meter with one of larger capacity, as it is proved the present means of registering the gas manufactured in winter is unreliable.

The following brief summary represents a comparative view of the working for the years ending March 25, 1878, and March 31, 1877—viz., gas sold and used this year, 219,577,900 cubic feet; last year, 221,391,000 cubic feet; decrease, 1,813,100 cubic feet. Value of gas sold, after deducting discounts, this year, £43,297, 15s. 11½d.; last year, £47,435 4s. 3½d.; decrease, £4137 8s. 4d. The profits this year amount to £8622 9s. 2½d.; last year, £6903 1s. 6½d.; increase, £1719 7s. 8d.

The present number of consumers is 19,312; last year, 18,550; increase, 762. New lamp services laid this year, 21; making total new services laid this year, 783.

2672 yards of new and additional main-pipes have been laid during the past year in various roads and streets, at a cost of £1368 17s. 9d. The services referred to above cost £394 8s.; extensions on works during the year, £2261 15s. 6d.; making total amount chargeable to capital, £4025 1s. 3d.

During the past year, the illuminating power of the gas was tested daily on the Sugg-Letheby photometer, the gas being consumed in a "London" standard Argand burner at the rate of 5 cubic feet per hour, against two standard sperm candles, each consuming 120 grains of sperm per hour, corrections being made for barometric pressure and temperature if required. The average illuminating quality for the year was 17·91 candles. Only on one occasion the quantity of sulphur found exceeded that allowed by Act of Parliament, being 1·44 grains in excess. With regard to sulphuretted hydrogen, this impurity has, with few exceptions, never been detected in the ordinary and continual test. The gas has also been remarkably free from ammonia, only showing on rare occasions traces of this impurity.

SANITARY ASPECTS OF ARTIFICIAL LIGHT.

[From the *Medical Examiner*.]

Some time ago we called attention to some of the more prominent features of the question of artificial lighting in its economical aspect, and we now make no apology for turning to the important sanitary bearings of the subject. It is obvious that these must have especial reference to the vitiation of the atmosphere consequent on the combustion of the illuminating agent employed. It has been pointed out, that where a complete and effective combustion takes place, the only products formed are carbonic acid and aqueous vapour. In the case, however, of coal gas, in addition to these ordinary combustion products, small quantities of sulphurous and sulphuric acids are formed, having their origin in the sulphur compounds always present in small but varying quantity in ordinary gas as it is supplied to the public. In the event of the gas containing ammonia as well as sulphur, nitrogen acids are likewise formed during combustion; but as London gas is practically free from ammonia, the question of nitrogen acids may be here omitted. The sulphur acids produced by burning gas are so exceedingly small in quantity, that it is only by refined chemical tests that their presence can be identified, and it has not been established that these special substances in such minute proportion have any injurious effect on health, although there has been much agitation on the subject among many not thoroughly acquainted with the question. The greatest objection to the presence of sulphur in coal gas appears to be the injurious action exerted by the combustion of it on articles of furniture, more especially those constructed of leather or bright metal. The action is, however, extremely slow, and only becomes appreciable after a lengthened exposure of the articles in places, such as large shops, where great quantities of gas are being habitually consumed. In order to give the reader some idea as to the amount of these sulphur acids present in the atmosphere of an ordinary room where London gas is being burned, it may be mentioned that Dr. Odling and Mr. Keates have shown that the total quantity at any given time is very much less than would be produced by striking a common sulphur match.

In considering the general question of atmospheric vitiation from the use of the various sources of artificial light, whether oil, gas, or candles, the vitiating power which each material exerts on the surrounding atmosphere may, for all practical purposes, be measured by the oxygen withdrawn, and by the carbonic acid produced. The sense of oppressiveness felt on entering a room where a large amount of some combustible agent is being consumed, is no doubt due mainly to the presence of an undue quantity of carbonic acid, the correspondingly diminished amount of oxygen and the heated condition of the atmosphere being minor conditions.

In judging of the comparative vitiation produced by the commoner illuminating agents, the true mode of viewing the question is to ascertain the amount of oxygen required, and of carbonic acid produced, by the amount of each material necessary to be burnt in order to produce *equal quantities of light*. By this method of estimation, gas (of 16-candle value) stands highest on the list, followed closely by paraffin oil, and then by sperm and colza oils, and candles of sperm, wax, and tallow—that is to say, that in producing a given quantity of light, the least atmospheric vitiation is produced by gas, and the most by tallow candles. This statement is no doubt antagonistic to popular belief, for no idea is perhaps so generally received as that which attributes to gas a vitiating action far exceeding that due to the combustion of any other illuminating agent. This conception may be traced to the fact that in most cases where gas is used as a source of light, an amount of illumination is produced far exceeding in quantity that which would be generally obtained from oil or candles. In cases where we were formerly content with a couple of candles, or a single lamp, affording at most a light of six or eight candles, it is now often customary to employ a two or even a three-light gaselier, the burners of which give a combined light of from 16 to 24 candles. With such increased light there are corresponding and equivalent amounts of atmospheric heating and vitiation. The remedy is to be sought in more efficient ventilation, and when it is more thoroughly understood that an increased consumption of an illuminating agent must be attended with increased vitiation of the surrounding atmosphere, the unfounded abuse of coal gas which is so frequently heard will, it is to be hoped, entirely cease. The question of efficient ventilation is a most important one, the ordinary class of rooms being singularly deficient in any provision for either the egress of foul, or the ingress of fresh air. The accidental opening of a door, and the imperfect fitting of doors and windows, leaving small chinks and apertures through which some interchange may take place between the atmosphere of the room and the external air, are, as a rule, the only means by which a kind of ventilation, imperfect as it is inefficient, is carried out. Ventilating gas-burners are, it is true, occasionally used, but their adoption is the exception rather than the rule, and it would need a somewhat extensive series of pipes to render such a system suitable to a private house where gas is used more or less in every room. The so-called "ventilating globe burners" consist of an ordinary gas-burner surrounded by a globe, and suspended from the ceiling by means of a comparatively wide metal tube; within this tube is a smaller one used for conveying the gas, while the products of combustion ascend between the two pipes, and are carried away to the external air. The well-known "sun-light" is likewise a ventilating arrangement carried out by the same means. The best forms of ventilating burners have, in the pipe which takes away the products of combustion, a self-acting valve arranged in such a way as to prevent cold air descending the pipe when the burner is not in use.

It now only remains to consider the question of what is the best source of artificial light as affecting the eyesight. Very little knowledge of an absolute description is available on this branch of the subject, but it may be laid down as a general rule that flickering lights, and those of great intensity, are the most trying to the eyes. The Argand form of burner affords the steadiest and best light, and perhaps the arrangement which is least trying to the eyes is to be obtained by the interposition of a shade so placed as to screen all direct light-rays from the eyes, at the same time that sufficient illumination is obtained at the place required for work. A medium should also be chosen between too little light, on the one hand, and too much light on the other; for, in the first case, the eyes become strained in endeavouring to obtain correct vision, and, in the second place, they become dazzled by the excessive glare. The colour of the object to which the eyes are directed is also a consideration. In the pursuit of literary work, for instance, a tinted paper will be found less fatiguing to the vision than if the paper is of a pure white colour. Dr. Croft has recently called attention to the question of colour as affecting weak or deficient eyesight. He is of opinion that spectacles fitted with yellow glass afford more relief to the patient than the ordinary ones provided with blue glass. Such spectacles are now sold under the term of "Xanthoscopic," or "Nonactinic." With the curious results of General Pleasanton fresh in our memory as to the stimulating action of blue glass upon animal and vegetable life, the opinions of Dr. Croft possess a considerable amount of probability. It is not unreasonable to assume that there may be two conditions of impaired or deficient eyesight, in the one of which the eyes of the patient may be in a peculiarly irritable condition, and in the other case the eyes may be simply weak and requiring stimulation. In the first of these assumed cases, yellow glass would be the most suitable medium to employ for spectacles, as arresting the blue rays of the spectrum, while in the second case the stimulating action of blue glass might be reverted to with advantage. Much remains to be done in the study of the physiological action of various coloured lights, and their effects on health and disease, and a careful investigation would, no doubt, be attended with results which would certainly be of the greatest interest, if not of the greatest practical value.

New Gas-Works at Middleton.—The *Oldham Standard* of the 8th inst. gives a long and interesting account of the rebuilding of the gas-works belonging to the Middleton and Tonge Improvement Commissioners. These works were designed by, and carried out under the superintendence of, Mr. D. A. Graham, Gas Engineer, who, it appears, is about to leave England for New Zealand. Commenting on the gas undertaking of the Commissioners, our contemporary remarks that, "during recent years the townships have borrowed money on the security of the gas-works, which, however, has not been expended on the gas-works, although the gas department has had to meet the interest due on this money, which now amounts, we understand, to upwards of £5000; so that not only is the gas department expected to clear all its own expenses, but they have also to meet an annual charge of upwards of £200, the interest for this money borrowed. Our readers are, of course, aware that this sum will be probably soon be transferred to another account, so that the annual profits will henceforth appear as so much more by the amount of this £200 or interest which has up to now appeared against the gas department. We think that there can now be no question but that the Commissioners are possessed of one of the best gas-works to be found anywhere—at least, as far as the alterations have extended. The gas is perhaps not so dear, considering the enormous liabilities which the town accepted when the works were purchased from the Company, for we understand this concern has been saddled with a debt out of all proportion to its value when purchased for the Commissioners. Modern gas-works are much more ornamental structures than those of former days, when, if we were to judge from our own, they were made to look as hideous and repulsive as possible. We do not see why this should be so; and if the ornamentation is obtained without entailing an excessive expenditure, we think it desirable that æsthetic considerations should not be entirely neglected. In the case of these works, ornamental effect seems to have been attained without involving any large amount of cost, as it has been principally accomplished by stepping the bricks out and in, which has had the effect of showing a picturesque arrangement of shadow, which is very pleasing in its effect. The works, while they have been in progress, have attracted a considerable amount of attention from men without the district, and their completion, which is near at hand, will doubtless be viewed with great interest by the public generally. We trust when completed they will practically be found to be all that has been expected and predicted concerning them, while there can be no doubt that Middleton and Tonge and district will possess one of the handsomest works to be found in the kingdom. In regard to the pecuniary yield of the works in favour of the ratepayers, the annuities have a very damaging effect. The original works were bought at a very high figure, and since a deal of foolish money has been expended on them, to which fact the late Chairman of the Board would be able to testify. While Manchester pays 5d. per 1000 for annuities and loans, Oldham 9d., and Stalybridge 13d., Middleton pays 22d., and has lost by leakage 20 per cent., against 10 in most other places. It is, therefore, evident that if the Middleton works are to meet the incubus they have to bear, they must be made efficient."

PHŒNIX GAS COMPANY'S NEW GASHOLDER.

MR. CORBET WOODALL, M.INST.C.E., ENGINEER.

(*Continued from p.* 917.)

With the present number we publish the third of a series of drawings, illustrating the details of construction of the brick tank and gasholder now in course of construction for the Phœnix Company at their station in Kennington Lane, and we resume our abstract of the Engineer's specification for the same.

The specification provided that the concrete employed should be composed of seven parts of river ballast, sharp and clean, to one part of Portland cement, the whole quantity of ballast or other material and cement to be measured dry, the measure used not exceeding half a cubic yard in capacity. The ballast used was not to contain more than three parts of sand to four of stones, nor less than two parts sand in seven of the aggregate. The cement to be of the best quality, weighing not less than 112 lbs. per striked bushel, and capable of bearing, before breaking, a strain equal to 250 lbs. per square inch, after having been prepared seven days for testings. Before being used, the cement to be emptied from the bags and exposed on the floor of the shed for at least two days. The concrete when mixed to be placed in position by being shot from a height not exceeding 15 feet.

The footings were prepared by laying over the whole surface of the bottom of the excavated trench a floor of concrete 2 feet thick, in two courses, the same being carefully levelled. The upper surface of this concrete within the wall forms the floor of the tank.

In the 48 positions shown on the plan, on this floor, rest-blocks of concrete were formed after the wall was finished. Each block is 4 feet 6 inches long by 2 feet wide, and stands 6 inches above the floor level. The concrete was formed of five parts of ballast to one of cement, the upper surface of the blocks being made perfectly level with each other by a water-gauge. On the top of the mound, and through its sides, rings of concrete pillars are built, all having their foundations in the clay. Concrete floors are laid for supporting pipes, and to form floor of well, the two lower ones being one foot thick, and the floor of the well one foot six inches thick. The foundations of all the retaining walls are of concrete, and of the dimensions figured on the drawings. A bed of cement mortar (one cement to one sand) was laid over the concrete before the first course of footings was laid. In this wall, but in no others, two lines of iron band, each 2¾ inches by one-eighth inch, were inserted every five courses, the iron being tarred and sanded, and rivetted at joints.

In constructing the tank, the bricks used throughout were thoroughly sound, hard, and well-burnt stocks of uniform shape and size; any of less dimensions than 8½ inches by 4¼ inches by 2¾ inches were rejected. The mortar employed was required to be composed of three parts clean sharp river sand to one of fresh-burnt blue lias hydraulic lime, mixed and incorporated in a mortar-mill. The cement was required to be of the same quality as described for the concrete, and to be used in the proportions of one of cement to three of clean sharp sand, except where otherwise specified. The brickwork is executed in English bond, flushed up and grouted in at every course, all exposed faces of walls being finished with a neat struck and drawn joint. The bricks were soaked with water before using, and the walls and piers carried up regularly, so that no part was more than 3 feet higher than any other part, and the courses were kept level throughout.

The following are the dimensions of the tank wall:—

From the top of the concrete footing already described, for a height of 20 feet, the wall is of . . . 5 bricks, or 3 feet 10 inches thick

20 to 25 feet of height,	4½	,,	3 ,,	5 ,,	,,
25 to 30 ,, ,,	4	,,	3 ,,	0½ ,,	,,
30 to 35 ,, ,,	3½	,,	2 ,,	8 ,,	,,
35 to 40 ,, ,,	3	,,	2 ,,	3 ,,	,,
40 to top	2½	,,	1 ,,	10½ ,,	,,

The wall and piers are built in mortar, except in the seven bands, as shown in drawings, where they are built in cement.

There are 24 brick piers for carrying the guide-framing of the gasholder, each 7 feet deep by 5 feet 6 inches wide. Intermediately between the main piers are 24 secondary ones, formed by continuing the five bricks of thickness for a width of 3 feet 10 inches (5 bricks) to the top of the wall. For the height of 20 feet from footing, or as far as the wall is built against the solid clay, cement grout was run in at every course, so as to unite the wall to the back of the trench. The wall of the pipe-well is in cement 14 inches thick, standing on three courses of footings.

The specification provided that all stone should be laid on its natural bed, tooled on exposed surfaces, and bedded and jointed in neat cement. All stone, except bases for columns, to be "hard York." Twenty-four base stones were provided for guide-columns, each 7 feet by 5 feet 6 inches by 2 feet, from Bramley Hall Quarry, of the best quality, and free from any appearance of crack or shake; each stone having 7 holes for holding-down bolts, and dressed and sunk on surface to receive castings for base of column. There were also provided 24 caps for intermediate piers, each 4 feet by 4 feet by 6 inches. The coping round the wall of the tank is 2 feet 5 inches wide and 6 inches thick, put together in lengths of not less than 5 feet, exactly level and parallel with the rest-blocks at the bottom of the tank. The coping round the well is 18 inches by 14 inches, and the coping stones of the tank and well are chamfered and cut to the sweep of the same.

The Company provided the 30-inch inlet and outlet pipes shown in drawing, but the Contractor for the tank was required to fix the same, and provide all materials necessary for the jointing, being held responsible for the soundness of the work. He was also required to provide the flooring of oak planks for the pipes to rest upon, both inside and outside the tank wall. Each floor is 9 feet 9 inches long by 5 feet wide, spiked to four oak sleepers bedded in concrete.

COMPARATIVE ILLUMINATING EFFECTS OF COAL GAS, SPERMACETI, AND COLZA OIL.

English and French Standards of Measurement of Light.

By Mr. ROBERT BRIGGS, C.E., of Philadelphia.

[From the *American Gaslight Journal.*]

The measurement of the illuminating power of coal gas is established by law in both England and France, each nation adopting its own unit of value and conditions of burning for the unit material, and for the coal gas measured by it. The English unit is a "standard" spermaceti candle, which must have the size and dimensions known commercially, in 1860 and before, as a "6's" candle, and is taken to burn at the rate of 120 grains per hour. The "standard" candle itself has now a more certain character than it had 20 or 30 years since. Custom and necessity for a uniform basis of test have now fixed each detail of size, material, method of making the standard candles, much more definitely than descriptions or drawings can express them, until the "standard candles" of any good English maker, under exactly the same conditions of burning, are reliable to give equal light, within the errors of observation by the eye, or within 10 per cent. of probable actual error.

This standard candle, when used for establishing the value of illuminating power of coal gas of different qualities, is compared with a "standard burner." The latter, as usually taken in this country, is a "Sugg Argand," the dimensions of which are given by English law; but the absence of precise requirements as to form has permitted modifications which have increased the light-giving effect one-sixth or one-seventh above what would come from a burner of the form of 1860, without departing from the specified dimensions in the least. The legal requirement demands further that the burner shall consume at the rate of 5 cubic feet of gas per hour, under a pressure, at the point of ingnition, of 0·5 to 0·6 inch of water column, with a temperature of from 65° to 70° for both air and gas.

The French lawful unit for comparison and measurement of the light from coal gas is a Carcel lamp, of designated construction, which shall burn at the rate of 0·0942 kilos. (0·09250 pounds) of colza oil per hour. Every precaution has been taken by the law-makers to state all the conditions as to construction of lamp and nature of oil, &c., so as to ensure uniformity of value for the standard unit; but the result is very little more positive than that from the English law, based merely on a trade usage. Perhaps the light from the standard French lamp is slightly more constant in value than that from the English candle. The advantage is solely that of a doubt in its favour.

The French standard burner is a "Bengel" Argand, of designated construction, and it is stipulated that it shall be compared with the standard lamp when burning at the rate of 105 litres (or 3·7083 cubic feet) of gas per hour, under the pressure of from two to three millimètres (0·78 to 1·18 inches) of water column.

The comparison of the English standard candle with the French standard lamp gives 9·6-candle power for the lamp. The candle burning 120 grains per hour, or 0·01714 pounds of spermaceti, demands for 9·6 candles 0·13714 pounds, while the lamp burns its 0·09259 pounds of oil in the same time; and it results that the light-giving power of spermaceti to colza oil—the light-giving effects in both instances being the most favourable—is as 1·000 to 1·492. The comparison of the French standard gas-burner with the English one, in candle units, is an easy one. If 9·6 candles are to be the equivalent to 3·7083 cubic feet in light-giving power, how many candles will be equivalent to 5 cubic feet? Solution of this sum in the rule of three gives 12·944; or, for practical purposes, 13 candles.

It may be claimed with fairness that average coal gas having the specific gravity of 0·426, and being generally like the gas which formed the subject of discussion in the paper in the *American Gaslight Journal* for April 2, 1878 (by the writer of this article), may be taken to have an illuminating power of 15 candles; and accepting this value, the comparison of the light-giving effects of coal gas, of spermaceti candles, and of colza oil in Carcel lamps, may be exhibited as follows:—

Equivalent to One Standard Gas-Burner.	Weight each. wts.	Total Weight. lbs.	Weight of Material Consumed to give equal Light. lbs.
= 5 cubic feet gas . .	0·426 S. G.	= 0·0319 = 0·1595 . . .	1·000
= 15 candles	120 grs.	= 0·01714 = 0·2671 . . .	1·634
= $\frac{15}{9·6}$ Carcel lamp . . .	42 grms.	= 0·09259 = 0·1447 . . .	0·908

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is still not much that is new to report with regard to the coal trade of this district. The settlement of the dispute at the cotton mills in North-East Lancashire has naturally produced a firmer tone in engine classes of fuel, which will probably become scarce in the market as soon as the cotton operatives get fully to work, but with this exception there is no improvement whatever to report in trade. All classes of round coal, both for house-fire, gas-making, and iron-making purposes, are still very difficult to move, and with regard to the two last-named descriptions of fuel, very low prices continue to rule in the market. Best Arley for house-fire purposes is tolerably steady in price, but inferior sorts can be bought very low, and I have heard of an offer of gas coal (Arley) which would not leave much more than about 6s. per ton at the pit. This, of course, is an exceptional case, and for a considerable quantity, but it is an indication of what is going on in the market. Common coal for iron-making purposes is also extremely low in price, and those descriptions of round coal which will not bear stocking are pushed on the market at almost any figure. Apart from the special quotations which are made for quantities, and which are very difficult to ascertain, the average quoted prices at the pit mouth may be given about as under:—Best Wigan Arley for house-fire purposes, 9s. 6d. to 10s. 6d. per ton; second qualities of Arley, 7s. 6d. to 8s. 6d.; Pemberton four-feet, 7s. to 8s.; common round coal, 5s. to 6s.; burgy, 4s. to 5s.; and good ordinary slack, 3s. to 4s. per ton.

In the shipping trade extremely low prices continue to rule, owing to the heavy stocks held by many of the colliery proprietors, and which they are anxious to move in bulk.

In the iron trade there is still but little doing. Lancashire makers of pig iron manage to move off their present very small production to local consumers, but heavy stocks still remain on their hands, and with regard to outside brands offering in this district there is no material change to notice. For Lancashire pig iron delivered into the Manchester district the list quotations remain at 50s. 6d. to 51s. per ton for No. 3 foundry, and 49s. 6d. to 50s. for No. 4 forge, less 2½ per cent. The finished iron trade is extremely dull, but there is very little disposition to take lower prices, and Lancashire bars delivered into the Manchester district are quoted at about £6 2s. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the counties of Durham and Northumberland has been materially slacker within the past fortnight. The colliery offices have much difficulty in maintaining prices. There is scarcely any demand for second-class sorts, and the collieries are working very badly. The figure for very best coals is about 7s. per ton net. Second-class gas cannot make more than 6s. net. Shipments to the United States have commenced. The freight market enables north country coalowners to compete with the American gas collieries, though there is a duty of 3s. 6d. per ton imposed upon British coals imported into the United States. The freight is 5s. per ton Boston and Philadelphia, and 4s. per ton New York. Some cargoes of gas coals have also been shipped to Ireland. Freights in the coasting trade for steamers are low, and distant gas companies are thus enabled to buy best Durham gas coals at a moderate figure. Steam coals are equally low with gas. Best are from 9s. 6d. to 10s., and seconds from 9s. as low as 7s. 6d. per ton net. House coals have been reduced also. The better qualities shipped from the Tyne are 9s. 6d. per ton, less 2½ discount. The second-class steam coal trade continues to be very much depressed. Pits do not work much more than four to six days per fortnight, and the propects are not very good.

The coasting shipping trade could scarcely be worse than it is, unless there were no trade at all. There are few orders in the market, and the freights which are paid are unremunerative. Steamers do the bulk of the

trade, as they can carry cheaper than sailing vessels, and it is almost impossible for little ships of from 10 to 12 keels to get paying employment. Baltic outward rates have been down to £8 per keel Cronstadt, but there has been an advance of something like 2s. 6d. per keel from this low figure. There has also been a fall of 10s. per keel upon Mediterranean rates. So that generally speaking it will be seen the outward freight market greatly favours the shippers. The only branch of manufacturing trade in the north which shows improvement is the chemical market. Its tone is decidedly better. Some articles have advanced in price, and there are improved shipments to the Continent of Europe. The lead market is not very strong. Pig lead is selling £17 per ton; dry white lead, £24; red lead, £18 15s.; flake litharge, £19 10s. Copper flat; cake and ingot, £66 to £68; best selected, £72 per ton. The iron trade continues in the same dull state it has been in for so long a time. There is little demand for fire-clay goods or fire-bricks.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The accounts of the Arbroath Gas Corporation for the year ending the 31st ult. show a surplus of about £1000. The consumers share of this profit, being one-half, will give a rebate of 5d. per 1000 cubic feet in the price of gas, as against 2d. last year, thus practically making the price for the present year 5s. 3d. per 1000 feet. Under the local Act of Parliament the other half of the profit goes to the Magistrates and Town Council, to be applied to the public purposes of the community. The exact amount of the annual profit, and that of the reduction in price, have not yet been publicly stated, as the annual meeting of the Gas Commissioners has not yet been held.

Both the Edinburgh and the Edinburgh and Leith Gaslight Companies have just announced a reduction in price to 4s. 2d. per 1000 cubic feet, last year's selling price being 4s. 7d. in each case. The meter-rent, 2s. 6d. per annum, will in each case continue to be the same as at present, and so also will the discounts continue to be unchanged.

The Directors of the Selkirk Gas Company have declared the usual dividend of 10 per cent. on the profits of last year's transactions, and have reduced the price of gas from 5s. 10d. to 5s. 6d. per 1000 cubic feet.

In the report just issued by the Directors of the Hawick Gas Company to the Shareholders, there is shown a profit for the past year amounting to £1458 19s. 0½d., the share capital being £9250. The consumption of gas during the year has been about 20 million cubic feet. The Directors recommend that the price of gas for the ensuing year be fixed at 4s. 2d. per 1000 cubic feet, being a reduction of 10d. from the price of the previous year. It is estimated, taking into account the high illuminating power of the gas supplied (31 candles) and the quantity consumed, the price will now compare favourably with that of any other town in Scotland at such considerable distance from the parrot coal-fields.

At the last meeting of the Town Council of Rothesay, it was reported by the Gas Committee that the works under their charge were in a satisfactory condition, that there had been an increase in the amount of gas manufactured during May, to the extent of 134,000 cubic feet, as compared with the corresponding month of last year, and that the cost of production had been 8½d. per 1000 cubic feet less.

The arbiters selected by the Gas Commissioners of Kirkintilloch and the Gas Company have accepted their appointments, and, having met, have appointed Mr. D. T. M'Lay, solicitor, Glasgow, as their clerk in the submission; and they have also agreed on Mr. John Reid, of the Edinburgh and Leith Gas Company, as oversman.

By way of supplementing the item of news formerly mentioned regarding the expected reduction of the price of gas in Dundee, I may state that the annual meeting of the Gas Commissioners was held last week, when a most interesting and satisfactory statement was made by Mr. Mitchell, Convener of the Finance Committee, followed by some very valuable statistical information from Mr. Maxwell, Convener of the Works Committee. It appeared that during the last year £54,858 9s. 2d. had been realized from the sale of gas, and £5756 from the sale of chemical products, &c. The quantity of gas sold was 263,677,300 cubic feet. The expenditure had been £59,447 19s. The Commissioners had power to borrow to the extent of £200,000, and the sum borrowed amounted to £106,562 10s. The total amount expended on capital account at the beginning of the year was £98,571 8s. 10d., and during the year that sum had been increased by £13,929. The estimated expenditure for next year was £58,906, and the estimated revenue £60,197. The price of gas would now be reduced from 4s. 2d. to 3s. 11d. per 1000 feet, with 5 per cent. discount when paid within 28 days. The accounts were unanimously approved, and the price of gas fixed at 3s. 11d. per 1000 feet. A special vote of thanks was given to the Convener of Finance for his statement, and also to the Convener of Works for his diligent attention and services. It is worthy of mention that the plan of allowing discount has worked remarkably well, over £2000 being allowed last year as discount, representing 75 per cent. of the gas as paid prompt. The bad debts are reduced to a minimum.

The annual meeting of the Shareholders of the Catrine Gas Company was held last Tuesday evening—the Chairman, Mr. G. Parker, presiding. A dividend of 5 per cent. was declared on the present value of the shares, which is equal to 7½ per cent. on the original capital of the Company, and it was resolved to reduce the price of gas from 7s. 6d. to 6s. 8d. per 1000 cubic feet. During the past year extensive repairs were made on the gas-works, which are now in a much better position to meet the wants of Catrine, which is one of the most important manufacturing villages in Ayrshire.

At the annual meeting of the Muirkirk Gaslight Company, Limited, which was held on Monday, the 17th inst.—Mr. Charles Howatson, of Dornel, presiding—a dividend of 10 per cent. to the Shareholders was declared payable, free of income-tax, on and after the 20th inst., and the price of gas was reduced from 5s. 5d. to 5s. per 1000 cubic feet. It was announced that the loss of gas by escape and condensation for the past year was 8·62 per cent. So far as I am aware, there are only about half-a-dozen places in Scotland that claim to have a smaller result under the same head, while there are numerous places where the loss is admitted to range up to 20 per cent., and even higher.

The first annual meeting of the Coatbridge Gas Company, as incorporated by Act of Parliament, was held last Thursday—Mr. James Lusk in the chair. There was a large attendance. The report of the Directors, declaring a dividend of 10 per cent. on the original, and 7½ on the new capital, besides carrying over a balance, was unanimously adopted.

In his report upon the quality of the gas supplied in Glasgow, during the week ending the 15th of June, Dr. Wallace shows that the minimum ranged from 25·72 candles up to 27·23 candles, the average from 26·29 candles up to 27·41 candles, and the maximum from 26·67 candles up to 27·68 candles, the highest results in all cases occurring in the southern, or Tradeston district, which were very uniform.

An extraordinary meeting of the Shareholders of the Rothesay Water Company, was held a few days ago, when the following resolutions were unanimously adopted:—First, that the whole rights, property, and plant belonging to them be sold to the Burgh of Rothesay as at Whitsunday last, and the price, with interest at 4 per cent. from date of entry, be paid at Martinmas next. Secondly, that the Company be wound up voluntarily in terms of the Companies' Act, 1862. The following are the terms of the transference:—(1) The price shall be paid on the 11th of November next. (2) The entry of the Town Council shall either be at Whitsunday last, in which case interest at 4 per cent. per annum will be paid on the price from that date, or at Martinmas next, as the Shareholders of the Company may elect. (3) In addition to the payment of the sum of £25,000, the Town Council shall reimburse the Company for any sum above £10,000 expended by them on extension or capital account. (4) On payment of the sums last mentioned, the Company shall transfer to the Town Council, by such deeds as may be required, the whole rights, property, and plant belonging to them, except the sums owing to them, and cash on hand as at the 11th of November next. (5) The whole expenses of the transference shall be borne by the Town Council and the Company.

The Dundee Water Commissioners held a special meeting on Thursday week, for the purpose of having submitted to them a statement of the accounts for the year ending the 15th of May last. It appeared that there was a surplus of revenue from the previous year of £175 6s. 2d., that the revenue for the past year was £31,768 11s. 5d., and the expenditure was £31,827 9s. 4d., leaving a favourable balance of £116 1s. 3d. The domestic rate had yielded £14,951 14s. 7½d.; public rate, £2653 12s. 2½d.—both under estimates. The special rates had yielded £14,762 17s. 7d., being £762 17s. 7d. more than in the previous year, and more than double the sum they yielded in 1870-71.

The Superintendent of the Greenock Water-Works reports that on the 1st of June the water in store amounted to 452,571,179 cubic feet, or 129 days supply for all purposes. In one of the reservoirs the depth of water was fully 48 feet, and in other two fully 43 feet.

At a meeting of the Glasgow Water Commissioners held last Thursday, an elaborate table was submitted, showing the results of the system of night inspection recently instituted, as at date 9th of May. From this it appeared that the total average per head at the starting of the meters was 53·1 gallons per 24 hours, and at 9th of May it was 31·9 gallons, thus showing a saving of 21·2 gallons per 24 hours.

At a meeting of the Committee of the Town Council of Glasgow to consider the best means of disposing of the sewage of the city, held on the 14th inst., it was agreed to recommend to the Council that the sewage should be carried to Dalmuir, on the north side of the Clyde, and about seven miles below the city, where it will undergo a process of filtration before it is allowed to enter the river. The proposal embraces the interception of the sewage at a certain point in the city, and then carried to Dalmuir in a large sewer, which will have to be constructed for the purpose. If the Council approve of the scheme, it is more than probable that operations will be commenced at once to carry it into effect, as a considerable portion of the ground in the neighbourhood is now the property of the Corporation. This is in part the scheme of Sir John Hawkshaw, although his proposition was of a more extensive nature, and the point at which the sewage was to enter the Clyde was much more distant from the city, Sir John proposing that it should be conveyed to the Ayrshire coast. The proposal of the Committee will excite a good deal of interest, and probably no small amount of opposition.

A drainage scheme has been devised for the Burgh of Alyth, at a cost of fully £3000, and one for the Burgh of Irvine and Halfway, which is expected to cost over £1800.

The past week's Glagow pig iron market was tolerably steady, and a fair amount of business was done, On Friday afternoon the closing prices for buyers were 50s. cash and 50s. 1d. one month; sellers near, and generally about 1d. over the closing price on the previous Friday.

Coal is still a drug in the market, but it is thought that better times are drawing nigh.

SALE OF DUNDEE GAS AND WATER ANNUITIES.—Mr. D. G. Stewart, solicitor, Dundee, has just sold the following annuities which belonged to a trust estate:—Four annuity certificates under the Dundee Gas Act, 1868, amounting in all to £46 2s. per annum, were purchased for £1100; a water annuity for £22 15s. was sold for £546, and one for £5 for £120.

RESIGNATION OF THE ENGINEER OF THE BOLTON GAS-WORKS.—At a meeting of the Corporation Gas Sub-Committee, on Friday last, the resignation of Mr. Harrison Veevers, Engineer and Manager of the Gas Department, was accepted, his connection with the Corporation to terminate on the 31st of December next. Mr. Veevers has held the office since February, 1865, a period of over 13 years.

CLACTON-ON-SEA WATER SUPPLY.—The *Suffolk Chronicle* states that a trial boring, with a view to obtain a supply of water from the chalk, has been proceeding at this rapidly-increasing watering-place for some time, under the direction of Mr. Jabez Church, C.E. Water was struck at a depth of about 280 feet, but proved on examination to be considerably charged with salt. This having been shut out, the boring was continued, and last week, at 405 feet, water was again reached, which rose to within 35 feet of the surface, and promises to provide an abundant, pure, and fresh supply. It is intended to sink an artesian well at once, and to establish water-works, the Act for which, in conjunction with the gas-works, already in working order, was lately obtained.

REDUCTIONS IN THE PRICE OF GAS.—The Directors of the Reading Gas Company have given notice that, chiefly in consequence of the favourable contracts made fo rcoals, the prices of gas have been reduced, from and after the 31st of March last, as follows:—When the consumption shall not exceed 20,000 cubic feet per half year, from 4s. 3d. to 4s. per 1000 feet. Over 20,000, and not exceeding 40,000, from 4s. to 3s. 10d. per 1000 feet. Over 40,000, from 3s. 9d. to 3s. 7d. per 1000 feet. 1s. per 1000 feet extra for gas supplied beyond the boundaries of the borough. No charge is made for the use of meters unless the consumption is under 2000 feet.—The Gas Supply Committee of the Bradford Corporation have recommended that the price of gas be reduced from 3s. 4d. to 3s. per 1000 cubic feet from the 1st prox.

WOKINGHAM WATER SUPPLY.—A new Company has been formed, and incorporated by a Provisional Order of the Board of Trade, under the Gas and Water Works Facilities Act, 1870, for the supply of this district, which comprises the town and parish of Wokingham, and the parishes of Binfield, Warfield, Easthampstead, and Sandhurst, in the county of Berks. It is proposed to place the well and pumping-station on a site which has been secured near the Finchampstead Road, between the brook and the South-Eastern Railway, and the reservoir on a piece of land which has also been secured on the high ground between Wokingham and Bracknell, known as Windmill Hill. In the opinion of the Engineer, Mr. J.W. Grover, a supply of pure chalk water, sufficient for the district, will be obtained at a depth of about 400 feet, and in this view he is confirmed by the authority of Mr. Whitaker, one of the geologists of the Geological Survey of the United Kingdom. From the well, the water will be lifted by pumping engines to the reservoir, the elevated position of which will admit of its supplying nearly the whole of the district. The population within the area of supply is about 12,000, and the number of inhabited houses 2150.

Brisbane (Queensland) Gas Company.—The report of the Directors of this Company to Dec. 31, 1877, stated that the business was improving. During the latter part of the half year many new consumers had been obtained on the old lines of mains; and some extensions, notably that to the One-Mile Swamp, had been made, which promised a good consumption It had been decided to abolish the charge for rental of meters—a change which would doubtless be acceptable to the consumers. The loan of £10,000, referred to in the previous half-yearly report, had been completed, and the money so obtained would be applied to making important additions and improvements to the works, tenders for which were about to be called for. The net amount at credit of profit and loss was £2669 18s. 11d.; balance from last half year, £25 13s. 10d.—total, £2695 12s. 9d. After placing to the credit of reserve-fund £1000, there remained for distribution £1695 12s. 9d., out of which a dividend at the rate of 10 per cent. per annum, and a bonus of 2s. 6d., was recommended, absorbing £1500 0s. 6d., leaving to be carried forward £195 12s. 9d.

Hengoed Gas and Water Company.—The second general meeting of Shareholders was held on the 20th inst.—Mr. Lewis in the chair—when the Directors reported that the works were in a sufficiently forward state to commence the manufacture of gas on the 6th of December last, and they have been for some time duly completed, and are now in excellent working order. As intimated in the last report, the mains have been extended to Fleur-de-Lis and Pengam, and the Directors anticipate there will soon be a fair revenue from those localities. The Parish Authorities for that district have also desired to erect at once twelve public lamps, and the Hengoed and Maesycwmmer districts are expected to be soon similarly situated. The Rhymney Railway have already fitted up their station at Hengoed, and the Brecon and Merthyr Company have also fitted their stations at Maesycwmmer and Pengam, and are adopting gas on their signals between those stations, and the Directors hope the Great Western Company will follow the example of the other Railway Companies before next winter. The balance of revenue account was £57 6s., which it was resolved to carry to the credit of the current year.

Edinburgh Water Supply.—At the meeting of the Edinburgh and District Water Trust, on the 13th inst., a report was submitted by Mr. Coyne, in which he stated that the number of pipes laid since the works were taken over by the Trust was equal to 57½ miles, of which 41¾ miles were laid in extension of the system, and 15½ were relays instead of old, small, and corroded pipes previously in use. During the same period (eight years) the population supplied with water had increased by over 66,000. In addition to this large increase of population, a superior class of houses, having hot-water apparatus, had been built, and there had been a very large increase in the number and magnitude of industrial works for which water was required and used. Water for shipping, street-watering, and sanitary purposes had also largely increased in consumption. The middle and working-class population were rapidly acquiring habits of using more water than in former times, inasmuch as it was becoming quite a common practice to introduce baths into the new houses built for this class of citizens. He thought it expedient to bring the foregoing facts before the Board, with a view of fully informing them of the great problem and difficulty they had to contend with in supplying so vastly increased a population, and distributing a small quantity of water over so largely an extended area of supply, while they had no more present sources of water supply than those which were at the command of the old Water Company ten years ago.

A Moving Town.—The report of a very singular occurrence comes from Virginia City, Nevada. "Our town," says a local newspaper, "is very quietly and very slowly moving to the eastward, down the face of the mountain." This movement is attributed to the settling of the ground over the Bonanza mines. As all the town is "going together," there is little evidence on the surface of what is going on beneath. No cracks are to be seen. The Gas and Water Companies are better acquainted with the movements taking place in the ground forming the site of the town than most of its inhabitants, as the instability of the earth tells upon their pipes. On B and C streets, north of Union, the ground is said to be moving both north and east. A water-main uncovered the other day in B street was found to be telescoped to a distance of over a foot, and had, moreover, in it a great "kink," which made it necessary to take out a piece nearly 2 feet in length. At a pan mill in the town, the pipes, it is stated, "are crowding in from both east and west, owing to the settling of the ground in the neighbourhood. Although there are no cracks as yet in the central part of the town, there is a large and very ominous one to the westward. The International Hotel has moved east about 5 inches since it was built; and all the buildings in the part of the town where the hotel is situated have moved the same distance. The town is evidently travelling somewhere, but where it means to go nobody knows. In the meantime, except in the matter of gas and water pipes, no inconvenience has been felt.—*Ottawa Citizen.*

Register of New Patents.

272.—Wallace, R. W., Battersea Park, and Claus, C. F., Great St. Helen's "*Improvements in the purification of gas and utilization of by-products by the manufacture of secondary products therefrom.*" Patent dated Jan. 20, 1877.

This invention relates to the purification of gas, and the utilization of certain products resulting therefrom.

Instead of the scrubbers and purifiers now used, square towers are employed, filled with angle irons, or triangular bars of stone, stoneware, or earthenware. The angle pieces are placed together closely in layers. The gas to be purified is admitted to the bottom, and is conducted away from the top of the tower. Immediately above the outlet-pipe for the gas there are two additional layers of angle pieces crossing each other at right angles, or nearly so. These angle pieces are for the purpose of distributing the liquor. Over these two layers of angle pieces there is a so-called tumbling-box, into which the purifying liquid is discharged from a pipe attached to a force-pump, which raises the liquor from a reservoir placed below the tower to the top of the same.

As the purifying agent, to absorb the carbonic acid contained in the gas, ammoniacal gas or liquid ammonia is used, which is obtained by decomposing chloride of ammonium by means of burnt or slaked lime, this chloride of ammonium being obtained in a subsequent process hereafter described.

If the ammonia is used in the form of ammoniacal gas it is passed along with the illuminating gas through a number or series of the towers above described, and whatever quantity of ammonia remains unabsorbed is finally condensed in one, two, or more of the last towers of the series by a shower of water or weak liquid descending in the towers. This liquid is pumped from tower to tower in the opposite direction to that in which the gas travels, and the liquor ultimately resulting from this procedure, and which contains principally carbonate of ammonia, is drawn for further use from the tower, which by reason of its favourable temperature and other conditions will yield the liquid in the most concentrated form—that is to say, containing the greatest quantity of carbonate of ammonia; in other words, a kind of "fractionation" is allowed to take place in the towers or scrubbers, which may be aided by the application of heat from any extraneous sources. If this concentrating action of the towers should be found not sufficient to attain the desired object, the liquor is distilled in an apparatus separate from the gas plant, in order to obtain solutions of carbonate of ammonia of the required strength in a manner well known to chemists.

If the ammonia for the purification of gas is employed in the form of liquid ammonia, it is produced in separate apparatus by condensing the ammonia evolved by the action of lime on the chloride of ammonium in water or weak liquors, and the liquid so obtained is pumped in the opposite direction to that in which the coal gas travels from tower to tower, always keeping one, two, or more of the last towers or washing towers (as in the process above described) to prevent the remaining of any of the volatilized ammonia in the coal gas. In the concentrated carbonate of ammonia liquor is dissolved in separate apparatus an equivalent quantity of chloride of sodium; a current of carbonic acid is then passed through the mixture, whereby, as is well known, a bicarbonate of soda salt is deposited in the liquor—that is to say, according to the strength of the liquors employed, from about two-thirds to four-fifths of an equivalent of the chloride of sodium employed, whilst about one-third to one-fifth of an equivalent of the chloride of sodium, as well as of the corresponding quantity of carbonate or bicarbonate of ammonia, remains in solution, either as bicarbonate of soda, or, if heat be applied to the mixture, as chloride of sodium.

Other compounds of ammonium that may have been present in the original carbonate of ammonia solution employed, such as sulphide of ammonium or sulphocyanide of ammonium, do not enter into this decomposition, and remain in the mother liquors. Simultaneously with the bicarbonate of soda an equivalent quantity of chloride of ammonium is formed as mother liquor, from which the bicarbonate of soda is separated by filtration. By applying heat to this mother liquor the carbonate of ammonia is distilled off, and also the volatile sulphide of ammonium, which may also exist in the mother liquors, and these products are collected to be used again.

After the volatile compounds of ammonium have been driven off, burnt or slaked lime is put into the still, thereby producing ammoniacal gas, which is employed in the purification of illuminating gas.

Instead of dissolving the chloride of sodium in solutions of carbonate of ammonia, as above described, concentrated or strong solutions of these salts may be made separately, then mixed together, and carbonic acid injected into the mixture. Instead of water, the mother liquor containing chloride of ammonium and chloride of sodium may be used for washing the illuminating gas in the towers, and caused to absorb fresh quantities of carbonate of ammonia therefrom. The liquor may then be employed for dissolving fresh quantities of chloride of sodium, and further quantities of bicarbonate of soda are manufactured from it. The above operation may be repeated once, twice, or as often as may be found convenient. It is not necessary to use the mother liquor for washing the coal gas, but if it has been used for this purpose, and its use is discontinued, the liquid which contained principally chloride of ammonium is then treated as above described.

As the ammonia derived from the coal gas itself is constantly added to that which is introduced into the circulation by this process, the quantity accumulated in excess of the quantity required for the purpose of purification is conducted into sulphuric acid or hydrochloric acid for the manufacture of commercial salts of ammonium. The chloride of calcium formed by the action of the burnt lime on the chloride of ammonium may be either utilized in any convenient manner, or discharged as refuse matter. The bicarbonate of soda obtained is heated in closed vessels, to deprive it of one equivalent of carbonic acid, which, being unmixed with other gases, is collected in a gasholder, and forced therefrom, by means of suitable pumps, into the mixture of carbonate of ammonia and chloride of sodium, as above described. As an auxiliary source of carbonic acid, that obtained by heating bicarbonate of potash or soda is used, after these bicarbonates have been produced from the carbonates by means of impure carbonic acid obtained from known sources.

The use of ammoniacal gas or liquid ammonia has been already proposed for the purification of illuminating gas from carbonic acid, but in every instance the proposed method of its application has involved the use of slacked lime in connection with ordinary gas liquor, and therefore insoluble carbonate of lime has been produced. This product has proved a more formidable nuisance and a more disagreeable residue to dispose of than that obtained from the dry lime purifiers now used, a fact which has hitherto prevented the application of this otherwise effective process of purification. In all these processes, moreover, the carbonic acid in the ammoniacal liquor (which, in its soluble form, represents a certain value) has been not only lost, but has actually been converted into a source of annoyance.

One object of this invention is to obviate these difficulties by utilizing the carbonic acid, without producing any solid refuse, as the chloride of calcium may be run into sewers or rivers, in which it will act as a disinfectant. A part of the chloride of ammonium liquor may also be decomposed by sulphide of barium instead of by lime. If this decomposition is effected with heat in a closed boiler, sulphide of ammonium is volatilized, and may be condensed in acid, or otherwise utilized, and chloride of barium obtained at the same time. By passing sulphurous acid through this sulphide of ammonium, hyposulphite of ammonia is produced (if the temperature of the liquor be kept down sufficiently), which hyposulphite may be decomposed by sulphuric acid, and the sulphurous acid set free may either be conducted into leaden acid chambers, or used for the purification of gas obtained from sulphide of hydrogen. If the sulphide of ammonium is conducted at once into acid, the sulphide of hydrogen is burnt into sulphurous acid, and the latter is passed through sulphide of barium solutions for the production of hyposulphite of baryta.

Solutions of sulphide of barium are also employed for the purification of gas, either—first, for depriving the same simultaneously of its carbonic acid, and of the sulphide or bisulphide of carbon contained therein; or, secondly, for freeing it from the sulphide or bisulphide of carbon only after the carbonic acid and other impurities have been previously removed by other means.

For the elimination of the sulphide or bisulphide of carbon by this process the presence of sulphide of ammonium with the sulphide of barium is essential, as it induces the formation of sulphocyanide of barium by the assistance of heat. For this purpose the illuminating gas is passed in either a number of purifying tanks, or in suitable scrubbers through the solution of sulphides, as often as is found necessary, and the solutions are used either cold or heated. In this process, as used for the elimination of both the carbonic acid and the sulphide, or the sulphide of carbon, carbonate of baryta and sulphide of ammonium are obtained, which is separated by decantation, filtration, and distillation. In the use of this process for elimination of the sulphide or bisulphide of carbon only, the sulphide of ammonium is distilled off from the sulphocyanides, and the residual liquor containing the latter is used several times over for dissolving fresh quantities of sulphide of barium, in order to accumulate

the sulphocyanide of barium formed therein during the process of purification of the gas. When the compound has sufficiently accumulated in the liquor it is separated, by any convenient process, for the manufacture of prussiate of baryta or prussiate of potash.

After the illuminating gas has been freed, in the first set of towers or scrubbers, of its carbonic acid by means of ammoniacal gas or liquor, and in the second set of its bisulphide of carbon, it is purified from the sulphide of hydrogen contained therein, by admitting sulphurous acid gas derived from the decomposition of hyposulphite of baryta by means of hydrochloric acid; the sulphur thereby set free is collected and used, after it has been washed and fused, as in the recovery of sulphur from alkali waste. Each set or series of the towers is worked by itself, the last one or two towers of each set being used for washing; and water, mother liquor, or weak liquor, being used separately therefor. The gas, however, passes through all of the towers in an uninterrupted current.

341.—Cotterell, F. J., Birmingham, "*An improvement or improvements in sliding gaseliers or gas chandeliers.*" Patent dated Jan. 26, 1877.

This invention has for its object to turn off the gas from the gaselier or gas chandelier, by the raising of the sliding part or body to its full extent, that is, by raising it into the position in which it is usually brought when out of use, so that in case of the falling of the sliding part by the breaking of the chains or weights by which the gaselier is balanced, there is no escape of gas.

This object is effected in the following manner:—In the gas-pipe, commonly called the down pipe, which is connected to the ceiling, and which conveys gas to the sliding part or body of the gaselier, is fixed a tap or stopcock, situated immediately below the pulley frame over which the chains of the balance-weights work. The plug of this stopcock is provided with an arm, lever, or handle, projecting from the down pipe, the end of which may be hooked or have a loop upon it. When the stopcock is open, and gas is permitted to pass through the down pipe to the sliding body of the gaselier, the arm, lever, or handle being horizontal, or at right angles to the down pipe; but when the arm, lever, or handle of the stopcock is turned so as to place it vertical or parallel with the down pipe, the stopcock is closed, and the gas is cut off from the sliding part of the gaselier. The closing of the stopcock is effected by the raising of the sliding part of the gaselier; that is to say, when the sliding part of the gaselier is raised to its full extent on the down pipe, the top of the water cup of the sliding part striking against the projecting horizontal arm or handle of the stopcock below the pulley frame, turns the handle and closes the stopcock. The gas is thus cut off from the sliding part of the gaselier, and in case the latter should fall, there is no escape of gas. When it is required to use the gaselier it is only necessary to bring the projecting handle of the stopcock into a horizontal position, to re-open it and permit of the gas passing to the sliding part of the gaselier. The opening of the stopcock may be conveniently effected by a hood rod being engaged with the looped or hooked handle of the stopcock, or by a small lever attached to the water cup. A chain or cord is attached to this lever, and by pulling it the lever is engaged with the arm of the stopcock.

422.—Kirkham, T. N., Westminster; Hulett, D., High Holborn; and Chandler, S. and J. C., Newington Causeway, London, "*Improvements in apparatus for the purification of gas.*" Patent dated Feb. 1, 1877.

This invention has for its object improvements in apparatus for the purification of gas, and relates more particularly to an improved washer or scrubber for the purpose of condensing, washing, and purifying gas, air, or vapour. It consists in the employment of a vessel of cylindrical or other convenient form, placed either horizontally or vertically, and into it is fitted a shaft working in bearings or stuffing-boxes. Attached to this shaft is a series of concentric tubes, leaving sufficient space between for the gas to pass through. This shaft may be made to revolve or not, as may be required. The tubes may be made of plain or perforated metal, wood, or other suitable material, or woven wire may be used.

The patentees do not bind themselves to concentric tubes, as the same object can be attained by using sets of tubes attached to the shaft, with spaces between for the gas to pass, or by a volute, or by louvres placed either horizontally or vertically.

The action of the apparatus is as follows:—The whole of the concentric tubes, volutes, louvres, or their equivalents, attached to a shaft, are caused to revolve by means of steam or other power, and the vessel being charged with water or other liquid to the required height, the whole of the tubes become wetted, and the gas, air, or vapour having to pass through the spaces on its way to the outlet, comes into contact with them.

431.—Pope, J., Folkestone, "*Improvements in taps or cocks, which improvements are also applicable to regulating the flow of water to water-closets and other like receptacles.*" Patent dated Feb. 1, 1877.

This invention consists essentially in the employment of a conical plug arranged relatively to a seat of corresponding form in the line of flow of the water, and carried by a stem or spindle passing through a gland or stuffing-box to the exterior, in such a manner that, by the act of depressing the stem or spindle, the plug shall be removed from its seat, and the tap or cock thereby opened for the discharge of the water, but that so soon as the hand of the operator is removed, the plug shall be forced to its seat by the pressure of the water, and the tap or cock thus closed, in which position it is maintained by the pressure of the water until again opened by the hand of the operator. If required, a lever may be employed, in order to obtain increased power for operating the plug, and means may be provided for maintaining the tap or cock in its open position without the necessity for the operator retaining his hold of the stem or spindle.

448.—Wightman, G., Elksley, and Alley, S., Glasgow, "*Improvements in water-meters.*" Patent dated Feb. 2, 1877.

The patentees describe and illustrate several modifications of their invention, and they claim—

1. The combination of an intermittently rotating drum with a weighted catch lever, and placed in the upper part of a casing or vessel filled partly with air and partly with water, the parts being arranged and operating substantially as described.

2. The placing of a combined drum and weighted catch lever, or equivalent details, which measure by weighing separate portions of the water in the upper part of a casing in which air is confined under pressure, and from which the water is discharged under pressure.

3. Appliances described for renewing the air in the meter when it is confined under pressure.

4. The constructions or modifications of proportional valve apparatus described.

5. The imparting of rotation to the moveable part of the proportional valve apparatus.

6. The system or mode of proportionally dividing the water passing through the meter by passing it, under equal conditions, through a number of equal holes or slits, one or a small number of which communicate with a passage leading to the measuring details, substantially as described.

487.—Mather, W., Salford, "*Improvements in apparatus to be used in raising water from artesian and other wells.*" Patent dated Feb. 5, 1877.

This apparatus consists of a bush fixed in the rise-pipes above, or in the suction-pipes below when pumps are used. The lower end of this bush fits in a bush attached to the upper end of the pipe which collects the water from the bottom of the well. The two bushes are connected, by studs in the one fitting into slots in the other, and the upper bush is surrounded by three or other number of india-rubber or other packing rings, which are expanded by the weight of the rise-pipes, and contract when the weight is removed.

502.—Chatwin, T., Birmingham, "*Improvements in screw wrenches or screw spanners and in gas grips.*" Patent dated Feb. 6, 1877.

This invention consists of improvements, having for their object the rapid and accurate adjustment of the moveable jaws of screw wrenches or screw spanners and gas grips. These improvements are in part applicable to those kinds of wrenches or spanners commonly called Budding's spanners. In the Budding's spanners the bar of the spanner on which the moveable jaw slides has on its back edge a rack, or a series of inclined teeth, a milled screw, or a wheel working between a fork at the back of the moveable jaw engaging with the rack teeth. By turning the milled screw, or wheel, the moveable jaw may be adjusted the required distance from the fixed jaw at the head of the wrench or spanner.

For the purpose of permitting of the milled screw, or wheel, of the spanner being rapidly thrown into and out of gear with the rack teeth described, it is proposed to construct the parts in the following manner:—The milled screw, or wheel, is mounted upon an axis jointed at one end to the top branch of the fork of the moveable jaw, and capable of turning upon the joint as a lever. The other and free end of the lever axis passes through and works in a slot in the bottom branch of the fork, the projecting end of the lever axis being provided with a short handle, or thumb plate. By passing the thumb plate of the lever axis outwards—that is, from the back edge of the bar—the lever axis takes an inclined position, and withdraws or ungears the milled screw, or wheel, from the rack teeth. The moveable jaw is now at liberty to be moved by a sliding motion on the bar, so as to rapidly adjust it at the required distance from the fixed jaw. On removing the pressure from the thumb plate end of the lever axis a spring in the slot in the lower branch of the fork, bearing against the lever axis, presses it into its normal position and re-engages the milled screw, or wheel, with the rack teeth, and by now turning the milled screw, or wheel, the fine adjustment of the moveable jaw may be effected.

The improvements described in Budding's spanners may also be applied to the adjustment of the moveable jaws of gas grips.

The invention consists further of the following improvements in screw wrenches or spanners:—Instead of a milled screw, or wheel, for engaging with the rack teeth on the back edge of the wrench, or spanner, a sliding bolt is used, working in a slot at the back of the moveable jaw. The front of this bolt is made into rack teeth corresponding with the rack teeth on the back edge of the bar. The toothed bolt is worked by a lever pressed outwards by a spring, so as to press the sliding bolt into gear with the rack teeth on the bar. By pressing the thumb plate end of the lever inwards, or towards the back of the bar, the sliding toothed bolt is moved outwards, and disengaged from the rack teeth on the back of the bar, and the moveable jaw is released, and may be adjusted nearer to, or further from, the fixed jaw by sliding it on the bar. After the adjustment of the moveable jaw the lever of the sliding bolt is released, when the bolt is pressed inwards, and its toothed end made to engage with the rack teeth on the bar, and fix the moveable jaw in its adjusted position.

For the purpose of obtaining a finer adjustment of the moveable jaw than that afforded by the last described arrangement, two independent sliding bolts and levers, situated side by side, may be employed. In this arrangement the teeth of the toothed ends of the sliding bolts are not situated opposite one another, but the bases of the teeth on one bolt are situated equidistant between the bases of the teeth on the adjacent bolt, the distance between a tooth on one bolt, and the next tooth on the adjacent bolt being equal to one-half the length of a tooth on the back edge of the bar of the spanner. The result of this differential arrangement of the teeth of the sliding bolts is that by pressing alternately one or other of the levers, a fine adjustment of the moveable jaw, equal to the length of half a tooth, may be effected. When it is required to completely disengage the moveable jaw from the bar, for sliding it on the bar, both levers are simultaneously pressed so as to withdraw both bolts from the rack teeth.

552.—Bennet, H., and Bostock, I., Rugeley, "*Improvements in pumps.*" Patent dated Feb. 9, 1877.

This invention consists, first, in attaching to the bottom of the suction-pipe or pipes of the pump a semi-circular or turned-up pipe, terminating in a hollow pierced or perforated bulb or rose; and, secondly, in placing in the course of the suction-pipe or pipes of the pump, and at a considerable height above the level of the water to be lifted, a trap or pipe having a double bend in combination with an air vessel.

601.—Nawrocki, G. W. von, Berlin, "*Improvements in water-meters.*" A communication. Patent dated Feb. 14, 1877.

This invention is not described apart from the drawings.

635.—Clayton, L. and L., Hunslet, "*An improved mode of and apparatus for punching metal plates to be used as gasholder top sheets.*" Patent dated Feb. 15, 1877.

This invention consists of an improved arrangement and apparatus for punching sheets or plates for plating gasholder tops, by which means the plates can be punched and prepared without the aid of a template, and punching the holes one at a time, as is usually the case.

The row of holes near the edge at each side of a plate is first punched at one stroke or one time (the punches radiating to the centre) with a punching machine prepared for that purpose, whereby any number of holes can be punched at one time, providing the punch bar and die bed are long enough. After the plates are punched at each side it is necessary for the ends to be truly punched to fit the adjoining plates or sheets accurately at both ends, which are of a segmental or curved form, more or less, according to the circle the sheets are to make. This is done by means of punches and dies fixed in their beds and sockets, and made to the proper segment or curve forming the circle they are for, which beds and sockets are made the full length of the ends of the sheets or plates they have to punch. By this method the plates or sheets are punched with great accuracy, making those in the same row or circle exact duplicates of each other; the bottoms of the sheets are also punched so as to exactly coincide with the tops of the sheets joining to them.

The distance of the holes can be varied in pitch, and an ordinary punching machine prepared for the purpose can be used in punching the sheets or plates. The punches and dies can be fixed in any convenient way, so that the curves are truly formed. The plates for the whole of a gasholder top (either of convex or flat shape) can be punched before being fixed in their places, thus saving an immense amount of labour, and at the same time obtaining great accuracy.

640.—Haddan, H. J., Strand, "*Improvements in apparatus for cutting pipes, columns, shafts, and such like.*" A communication. Patent dated Feb. 16, 1877.

These improvements consist in the combination of a divided sleeve, having

a centring device, with a jointed revolving collar and cutter head, carrying a cutting tool actuated substantially for the purposes of embracing and cutting pipes, columns, shafts, and such like, of metal or other material, in their places without removal or otherwise. The sleeve is made to surround and to be affixed to the pipe or article to be cut, and is divided longitudinally into two parts or semi-cylinders. The two parts may be united by lugs and bolts, or by a hinge and lugs and bolts. The pipe is centred in the sleeve by means of radial set screws, and the collar is divided into two sections, works in the sleeve, and holds an adjustable cutter head.

641.—Reginall, R., Hull, "*An improved adjusting pipe-tongs.*" Patent dated Feb. 16, 1877.

These improved tongs consist of two arms moving upon a centre-pin close to one end, somewhat similar to the ordinary pipe or smith's tongs, in which the clasp of the hand upon the double arms is particularly advantageous in giving a very secure grip upon the pipe. In this invention, however, the centre-pin is placed through an open fork in the one arm, and in the middle of this fork the pin is swelled out to form a boss, which is drilled and tapped with a fine thread. The other arm is screwed into this tapped boss. The two arms will thus open and close similar to the ordinary tongs, but one of them can rotate on its own axis in the swivel boss, and by reason of the screw thread tapped therein, it will lengthen or shorten the under jaw by rotation from left to right, or from right to left respectively. This enables the width of the jaw to be altered to suit a variety of different sized pipes. The end of the fixed arm terminates in a bent hook to clasp the pipe, but the end of the under moveable or adjustable jaw terminates in a flat toothed face, which seizes the surface of the pipe with its serrated teeth and prevents slipping.

642.—Walker, W., Scholes, "*Improvements in rings for joints for steam, water, gas, or air.*" Provisional protection only obtained. Dated Feb. 16, 1877.

This improvement consists in a ring of circular or any other required form composed of cotton or other fibre, rubber, either pure or a compound, and wire.

Hitherto joints for man-holes, valve-chest facings, cylinder lids, or other joints, have been made from india-rubber, cotton, pure or compounded, and moulded to the shape required, thus preventing their use for any other shape than that for which they were made.

The improved ring consists of india-rubber, compounded or otherwise with cotton, flax, or other fibrous material, wrapped round a ring of wire jointed or otherwise; this ring of wire when complete forms the centre of the ring, and is of sufficient strength and flexibility to preserve the ring in its first form, or to allow of the same being bent to any other desirable shape, retaining such shape.

Another advantage of the improved ring in joint-making is, that in case the ring is not sufficiently screwed or tightened, it does not blow the ring past the bolts; the centre wire preserving its form.

657.—Green, C. H., Old Broad Street, London, "*Improvements in the arrangement and construction of gas-stoves and utensils to be used therewith, and for other purposes.*" A communication. Patent dated Feb. 17, 1877.

This invention relates to the manufacture of a stove having gas as a fuel, and which can be used either as a cooking or heating stove; and also to appliances which can be used either with gas or other stoves for cooking and heating purposes.

A casing is made, preferably of cast iron, larger at the bottom than at the top, and from one to two feet in height as may seem best. A rim may be placed and fastened to the bottom part of the casing, so as to diminish the danger of its being upset. An ordinary gas supply-pipe is inserted through the side of the casing, and at the centre of the inside of the casing another pipe is joined to the one mentioned above, and which passes upward to near the top of the casing and is there fastened. A perforated plate is placed across the inside of the casing near the top, and is covered with a radially corrugated concave cap, which forms a mixing chamber and air inlet that does not interfere with the regular flow of the gas, the corrugated plate containing channels to conduct the gas to the burning point. A rim is placed and fastened to the top of the stove, for the purpose of supporting a heating drum, or cooking utensils; a metal plate is also placed centrally within the casing, and immediately below the orifice of the supply-pipe.

687.—Russell, W., and Wilson, R., Croydon, "*Improvements in locks or fastenings for securing the lids to the bodies of gas syphon-boxes, and other similar cases or coverings.*" Provisional protection only obtained. Dated Feb. 20, 1877.

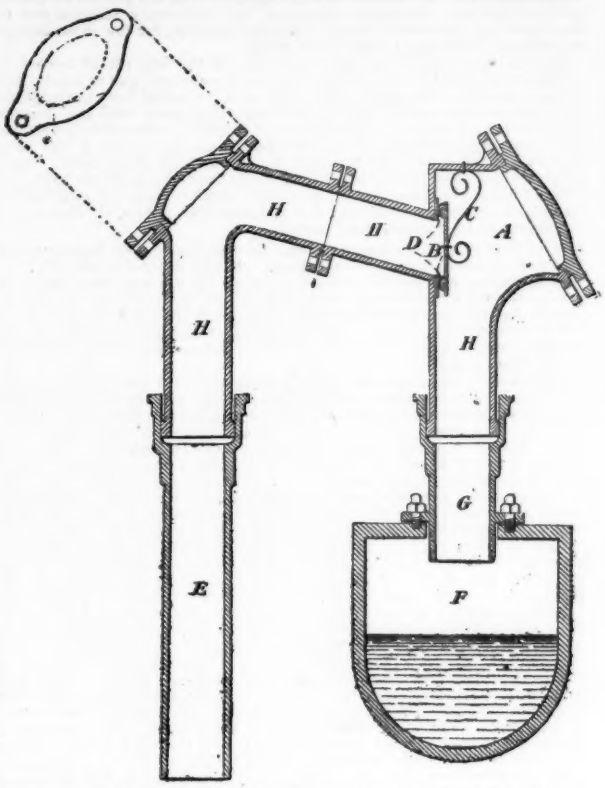
This invention has for its object the production of a secure and more convenient fastening for the lids or covers of gas syphon-boxes, street hydrant-boxes, public light meter-boxes, the lids of boxes placed in the street and used to obtain access to telegraph wires, the ventilators of sewers, the doors covering the entrance thereto, and for other similar purposes.

The invention consists in forming on the under-side of the lid or cover a flat circular boss, having through its centre, and that of the lid, a hole which serves for a key-way. This hole is circular, but has on two opposite sides an indent cut to receive the feathers of a key. Beneath the boss is a moveable piece of metal or bolt, having two arms, with a key-way in the centre, of the same size and shape as that before described. On each of two sides of the key-way is a concentric slot, and through each of these slots passes a flat-headed screw so as to secure the moveable piece of metal or bolt to the boss before mentioned, but not so tightly but that it may be turned round by the application of a key, which is made of the shape and size to fit the keyhole loosely. On each of two sides of the syphon-box is cast a recess, into which the ends of the two arms of the bolt may enter; or, in lieu thereof, there may be cast or fixed two small lugs or studs, having their bottom surfaces inclined to the horizon, but in opposite directions. When the lid or cover is placed on the box, the key is inserted in the keyhole, and passes through the boss into the moveable piece of metal or bolt, and, on being turned, causes the arms either to enter the recesses mentioned, or to press against the under-sides of the lugs or studs before alluded to; and, in consequence of these studs having their under-surfaces inclined, the lid is held firmly in position, and cannot be removed without the aid of the key. In either of these arrangements, when the lid is closed, the removal of the key locks the lid; consequently, no lid can remain in its place unfastened.

663.—Newman, J., and Duesbury, W., Litchurch, "*Improvements in apparatus for transmitting gas from the retorts to the hydraulic main.*" Patent dated Feb. 17, 1877.

This invention has for its object improvements in apparatus for transmitting gas from the retorts to the hydraulic main.

The gas from the retort is at present conveyed into the hydraulic main by a pipe dipping into the liquor contained in the main; so that the gas has to force its way through the liquor. This invention is to obviate this, by so constructing the pipe hereafter described, which forms the



Newman and Duesbury's "Improvements in Apparatus for Transmitting Gas from the Retorts to the Hydraulic Main."

connection (with the pipe G) between the ascension-pipe and the hydraulic main that it will contain a chamber.

In the annexed drawing, the pipe, H, H, H, which forms the connection between the ascension-pipe, E, and the hydraulic main, F, is constructed in two parts, one part so that it will contain the chamber A, for the purpose of allowing the clack and spring to work. In this chamber are placed a clack and spring, marked B and C, also a smooth face-plate, marked D, for the bed of clack, which will open when carbonizing coal, and instantly close against all back pressure. G is the dip-pipe connecting the pipe, H, with the hydraulic main, F.

The gas will be delivered into the hydraulic main, F, free from any seal or dip, thus removing all hydraulic pressure from the retorts, and thereby lessening the formation of carbon on the retorts, and giving an increased yield of gas from the coal carbonized. The effect will also be to carbonize the coal in less time, and to lengthen the durability of the retorts.

The apparatus, being self-acting, removes the absolute necessity for exhausters or engines.

688.—Hunt, C., Birmingham, "*Improvements in gas-meters.*" Patent dated Feb. 20, 1877.

This invention has for its object the construction of meters in such a manner as to admit of their being worked at an increased pressure, and beyond their normal speed without affecting the accuracy of the registration and the steadiness of the lights.

The invention consists—

1. In either removing the division-plate between the front or float-chamber and the drum-chamber, or by making a communication between the two by one or more holes above the water line, so that the inlet gas passes at once from the inlet-pipe into the drum-chamber, and enters the drum by the slits in the hoods. The measured gas finds its way into the hollow cover, and leaves the drum by the bent tube or spout on its way to the general outlet of the meter, which may be placed either at the side or top of the apparatus; in other words, the gas passes through the drum in the opposite direction to that ordinarily the case.

2. In dividing the front or float-chamber into two portions, the inner one being in communication with the drum-chamber, and the outer one serving as a water reservoir. Attached to the upright spindle of the meter is an eccentric, or cam, which causes a spoon to rise and fall, and at each elevation to lift a small quantity of water, and deposit it in that portion of the front chamber which is in communication with the drum-chamber. By these means the correct water level is constantly maintained. The float-chamber has also a transverse partition reaching up to the top of the float, but having a small opening near the bottom of the division, so as to allow of a communication for the water between it and the other portion from which it is divided. The object of this partition is to prevent any alteration of the level of the float by a sudden influx of water. There is also a waste-water box below the previously described front chamber, into which the bottom of the outlet conduit passes, and dips into a seal cup, so as to prevent the extraction of unregistered gas by pricking the outer case.

Fig. 1 is a front elevation of the meter, with the front plate of the square box or float chamber removed; and Fig. 2 is a transverse or side sectional elevation.

In these, A is the outer case of the meter; B, the inlet-pipe for the gas; C, the float, which is free to rise and fall in the float-chamber, D. This chamber is divided from the rest of the outer chamber by the partition, E, but this partition is not essential. The gas having passed into the body of the meter finds its way through an opening or openings in the case above the water-line, as at W, into the drum, F, by the slits in the hoods at the back, and from thence through the drum to the hollow cover, G. Here it descends by the spout or bent tube, H, and either passes up the tube, I, into the conduit, J, and so on to the outlet, K, at the top of the meter, or when the outlet is placed at the side of the meter the gas, instead of going by way of the conduit, J, flows through the pipe, L, to the outlet, M. If thought desirable, the gas may be conveyed from the pipe, I, to the outlet, M, by an alternative pipe or conduit, shown by dotted lines, and marked X. N is the filling-pipe, or pipe by which the meter is charged with

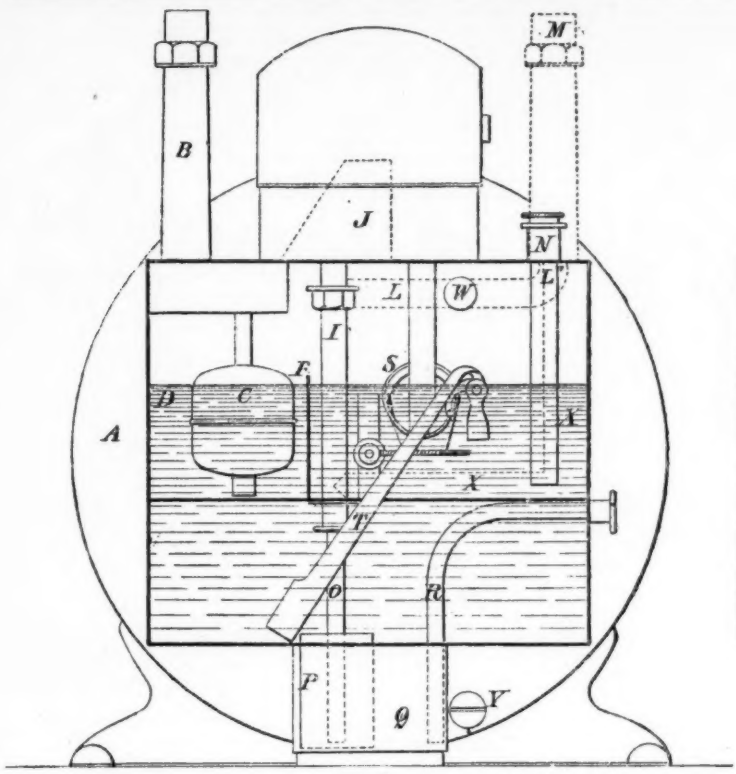


Fig. 1.

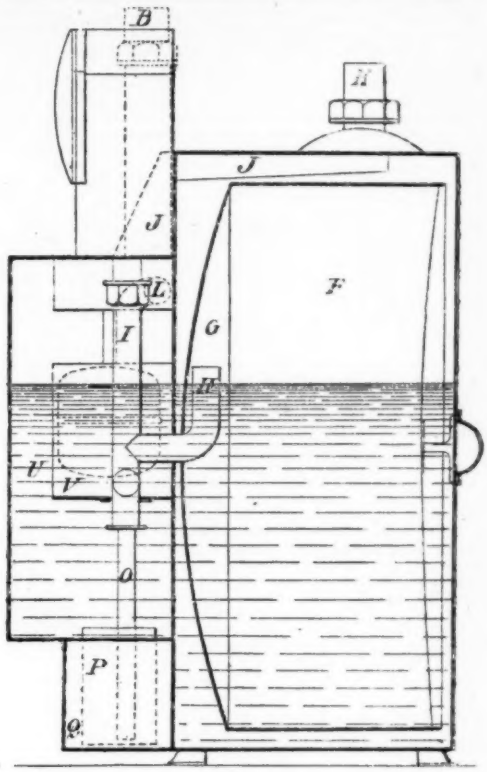


Fig. 2.

Hunt's "Improvements in Gas-Meters."

water; O is a pipe for carrying off any water that may accidentally get into the spout, and so lead it to a well or seal cup, P, placed within the waste-water box, Q; and R is a pipe for drawing off any accumulation of water within the waste-water box. S is the cam attached to the upright spindle; and T, the spoon lever, which on being raised lifts water from the water reservoir, U, and pours it into the chamber, V, which is in communication with the measuring chamber. Y is an opening provided with a screw-plug for emptying the meter.

The arrangement whereby the gas is driven through the meter in an opposite direction to that ordinarily done is not new, neither is the arrangement for maintaining a constant water level in the manner described new; but the combination of the two, as described, is new, and constitutes the present invention, whereby a more accurate measurement of the gas and greater steadiness of lights are ensured.

705.—Livesey, G. T., South Metropolitan Gas-Works, Old Kent Road, Surrey, "*Improvements in apparatus used in the purification of gas.*" Patent dated Feb. 21, 1877.

This invention has reference to the improvement of that class of vessel

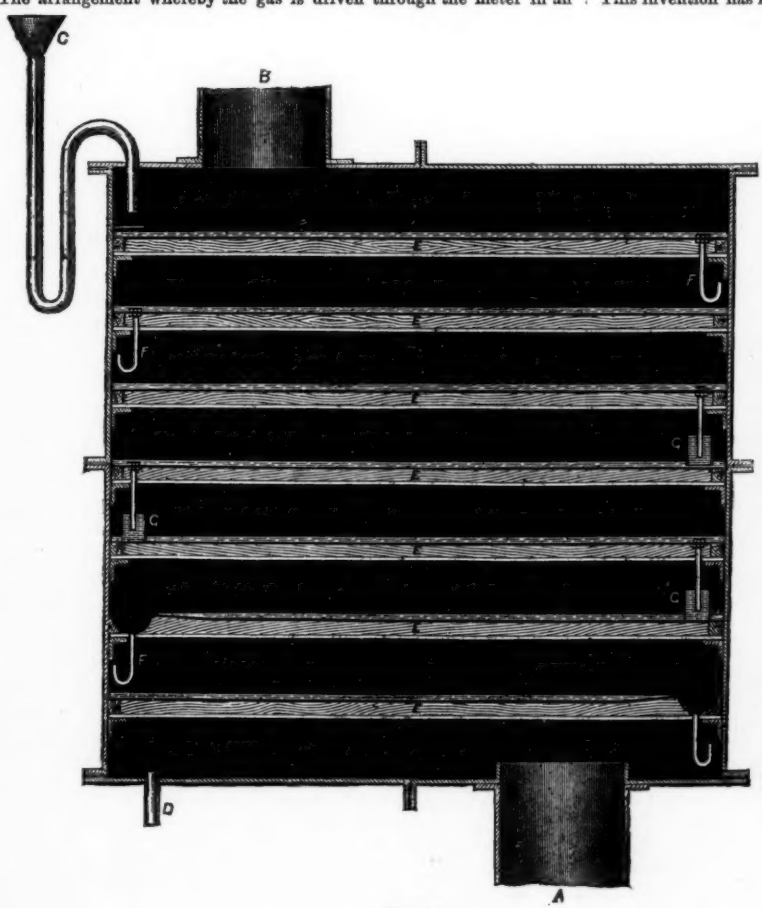


Fig. 1.

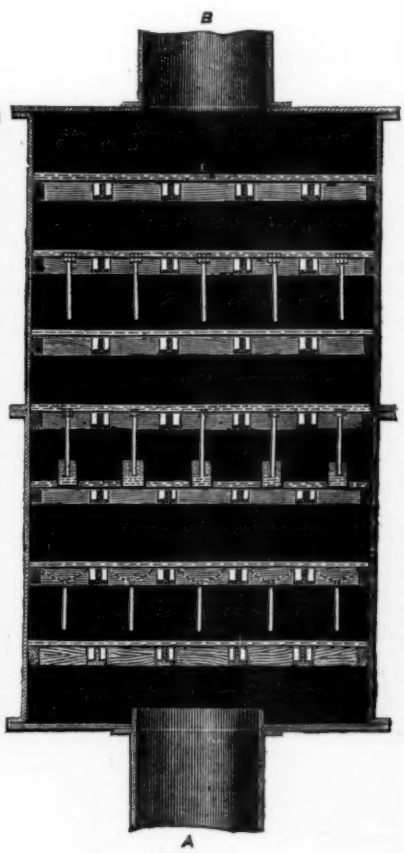


Fig. 2.

Livesey's "Improvements in Apparatus used in the Purification of Gas."

known as "washers," and has for its object the arrangement of the apparatus in such a manner as to render it more efficient for the abstraction of tar, ammonia, carbonic acid, and sulphuretted hydrogen, and cheaper in construction than in those generally employed.

The invention consists of a rectangular, circular, or other conveniently shaped vessel or case, covered both at top and bottom, and divided into a number of compartments by a series of horizontal discs or plates of metal perforated with a great number of holes, say of about 1-16th of an inch, more or less, in diameter. These discs or plates are fastened to the sides of the case, the joints being made water-tight. From one end or side of each plate or disc there is a tube which passes through, rises about half an inch (more or less) above it, and descends to within about an inch of the next lower disc, plate, tray, or sieve, where it dips into a larger tube or cup closed at the bottom, so as to seal the descending pipe when the apparatus is supplied with liquid; or the descending pipe may be curved like an inverted syphon, and so seal the passage.

With the view of providing even greater facilities for the free passage of the water or liquid from one tray to that next below it, than that afforded by the dip-pipes or tubes before described, it may be desirable to make these conduits extend the whole width of the vessel, and by slightly raising one end of the perforated plate forming the disc or tray about half an inch, more or less, and attaching to the raised edge a piece of plain sheet iron, which descends into a seal cup or trough on the next lower tray, a more efficient channel will be provided. By making the liquid conduits in this manner, a more convenient passage is afforded for the tar, and its possible accumulation on the trays is prevented. The case is provided with an inlet for gas at or near the bottom, and an outlet at or near the top. A pipe is also furnished for the delivery of liquid at or near the top, and an outlet for the same at or near the bottom.

In order that the foregoing may be more easily understood, drawings are attached of which the following is a description:—

Fig 1 is a front sectional elevation and fig 2 is an end sectional elevation. In fig. 1, E, E, show the perforated plates, trays, or sieves, screwed or otherwise fastened to wooden bearers, which are supported by T-iron bearers, these T-iron bearers being turned down at their ends, and bolted to the case. C is the water or liquid inlet, beneath which is a dash-plate to break the force of the liquid in its delivery. F, F, are the tubes for conveying the overflow liquid from one tray to another, and may be either curved or straight. In the latter case they are each surrounded by a seal cup, G. It will be seen that the three lower perforated plates are bent up, as before described, the overflow conduit being formed as shown, the bottom edge of the vertical plates dipping into seal troughs. A is the inlet for the gas, and B the outlet for the same, while D is the outlet for the liquid.

The action of the apparatus is as follows:—Water or other suitable liquid is delivered in a continuous stream from the supply-pipe into the vessel. Gas is also admitted from the inlet. The liquid falls upon the first perforated tray or disc, and would pass through it, and descend like falling rain, but is prevented by the ascending column of gas, which passes through the holes in the disc, and then forces its way through the half-inch stratum of liquid, the liquid being broken up and converted into froth by the gas in its endeavour to pass to the outlet. The liquid flows off from the top of each tray by the small tubes, or by the larger openings before described, into the seal cup or trough, which it overflows, and then falls on to the next lower tray. The same action takes place in each of the divisions or compartments before described.

It will be seen that although pure water may be admitted above, the result of its contact with streams of gas, so numerous as to convert them into bubbles, is to change the liquid into strong ammoniacal liquor, combined with other impurities, by the time it reaches the bottom, while the gas is at the same time subjected to a more thorough and efficient washing, in consequence of the innumerable particles into which it is broken up, and in consequence of the gas in its passage upwards coming into contact with weaker liquor, until in the top tray it meets with pure water only.

The invention is not limited to the number of trays arranged as described, nor is it confined to the application of these trays to vessels specially made to contain them, since they may be applied to existing vessel or parts of vessels.

In order to ensure the perfect action of the apparatus, it is essential that the perforations in the plates should not be too large. It is stated that they should be about 1-16th of an inch in diameter, but the size may be modified in proportion to the depth of the stratum of liquid on the plates, and also to the quantity and pressure of the gas admitted.

Washers made with perforated trays, which cause the liquid to descend like showers of rain within the vessel, are not new, but washers with trays having perforations of such a size, and arranged so as to produce the before-described effect, are new. In the former case the liquid passes in drops through the gas, whereas in the latter the gas passes in bubbles through the liquid.

706.—Jackson, W. M., Providence, U.S.A., "*Improvements in gas-stoves.*" Patent dated Feb. 21, 1877.

This invention consists in the new method for burning hydrocarbon gas, or the ordinary gas supplied in cities, by first heating the gas and then mixing the heated gas with air, thus supplying the proper quantity of oxygen required for the perfect combustion of the gas throughout the whole mass, and not, as is usually the case, in streams or layers, without the required atomic mixture.

The invention further consists in the peculiar construction of a stove or burner, in which a closed retort or heating chamber is provided, which, being surrounded by the burning flame, and connected with the gas inlet, and also with the outlet, heats and expands the gas before the air is mixed with the same.

726.—Johnson, S., Wood Green, and Burton, R., Clerkenwell, "*Improvements in gas-meters.*" Patent dated Feb. 22, 1877.

This invention consists of improved methods of constructing and arranging the parts of wet meters, by which the height or level of the water in the measuring chamber is adjusted; also of a method of supplying and retaining a sufficient quantity of water in the overflow-box through which any surplus water in the meter passes. The meter is thus rendered capable of being regulated from outside without disturbing any of its fixed parts, and greater cheapness of construction is attained than in wet gas-meters as heretofore ordinarily constructed and used. Within the square front of the meter (which serves as a reservoir for the supply of water to the measuring chamber, in the method well understood and practised in the construction of wet gas-meters) is arranged a vertical pipe or chamber, of any suitable shape and dimensions, but preferably circular in plan, and the upper end of this vertical chamber is made open, and rising nearly to the top of the square front or reservoir. The lower end of the vertical chamber is made closed, and provided a connecting-pipe, which forms a communication between the inlet gas-pipe of the meter and an opening in the bottom of the vertical chamber described, and a communication is also made between the lowest part of the connecting-pipe described, and the waste-water box below the square front or reservoir.

727.—Buchholz, J. A. A., Hammersmith, "*Improvements in the manufacture of gas for lighting purposes, and in machinery or apparatus connected therewith.*" Patent dated Feb. 22, 1877.

The object of this invention is to feed the gas-producing material into the retort continuously, and not in periodical charges, as has hitherto been the practice, the continuous feed being particularly desirable, if not indispensable, when the material referred to is at all of a bulky nature, such as maize, rice husks, or other ligneous substances.

The apparatus is so designed that, for the purpose of forming the joint where the feed and delivery take place, the specific gravity of the gases is brought into play, as well as the resistance to percolation offered by the loose aggregators of the material to be converted, and that of the coke, while the pressure under which this resistance operates is regulated through the exhauster and throttle-valve, in conjunction with the regulator, by the pressure developed inside the retort, and the natural and constant atmospheric pressure outside.

748.—Stove, A. S., Lerwick, "*Improvements in the manufacture of gas, and in the apparatus or means employed therefor.*" Provisional protection only obtained. Dated Feb. 23, 1877.

This invention has reference to a new or improved construction of water-luted escape valve or trap for allowing the free outlet passage of illuminating gas, as produced in the retorts, to the gas main or pipe leading to the purifiers or gasholders, instead of the usual hydraulic main and curved or bent pipe at the top of the retort, drawing, stand, or ascension pipe, and which dips into the water and tar of the hydraulic main. This improved valve, it is considered, will be more safe and convenient, and easier kept clean, than the appliances heretofore employed for a similar purpose. The nature and novelty of the invention consist in fitting a large close annular or trap-shaped valve-chest at the top of the gas ascension escape-pipe of each retort, having the upper end of the pipe projecting up in it some distance above the lower edge of the side branch for the escape of the gas from the upper part of the chest. Water is always kept in the lower annular part, into which the lower open mouth or lip of an arched or domed light metal automatic valve or stopper works over the upper projecting end of the escape-pipe, and guided by a light central rod projecting and working loosely up through a hood or sleeve formed or fitted gas-tight on the close top or cover of the chest.

765.—Boulton, M. P. W., Tew Park, Oxford, "*Improvements in apparatus for producing heat by the combustion of inflammable gases or vapours.*" Patent dated Feb. 24, 1877.

This invention consists in the combination of an annular gas jet with a mixing passage of varying sectional area, and in admitting a regulated supply of air to both the interior and the exterior of such annular jet of mixed gas and air, and in the modified construction of burner of the kind referred to, wherein the air and gas supply orifices are governed by connected valves.

795.—Dennis, T. H. P., Chelmsford, Essex, "*Certain improvements in water-waste preventers.*" Provisional protection only obtained. Dated Feb. 27, 1877.

This invention consists of further improvements on an invention for which letters patent were granted to present inventor, No. 431, dated Feb. 3, 1874.

This invention is for the purpose of flushing water-closets, urinals, or other purposes, where the quantity drawn or discharged is required to be limited, and the further improvements consist in the addition of a box or container affixed to the short leg of the syphon, and by reversing the action of the plunger, and making it fit into the box or container so as to be acted upon, by a lever and pull, by a lifting instead of a plunging motion.

796.—Milnes, J., Milnesbridge, near Huddersfield, "*Improvements in the construction of plug-taps and valves for water, gas, steam, and other purposes.*" Patent dated Feb. 27, 1877.

This invention consists in making the body of the tap larger in diameter than is in ordinary use for common taps, and filling the same with a plug, metal to metal. The openings through the body of the tap that the connecting-pipes are coupled to, are not placed opposite to each other, but are arranged so that the bottom of the orifice or hole on one side of the tap is above the top of the orifice on the other side of the tap. The orifices or holes in the plug correspond with the holes through the body, and are formed of such a size that there is no curtailment or contraction of area through the tap, but that there is the same area through the tap as in the pipes. When the plug is turned to close the orifices of the tap, the openings in the plug are opposite to the blank parts of the body, which are at different heights. By these means the distance between the openings at each side of the tap are increased, and this decreases the liability of leakage in consequence of the increased distance the fluid or gas has to travel round the plug between the orifices.

The second part of the invention consists of a loose seating for the class of valve commonly known as the mushroom wheel screw-valve, which are commonly made with a seat forming part of the valve body, so that when the same leaks, through the defectiveness of the seating, which is of common occurrence, the valve has to be detached from its position, and reground or refaced in the lathe, while by adopting these improvement, a new seating can be replaced at once without removing the valve, all such seatings being made duplicate, so that the same will fit any valve of the same diameter.

APPLICATIONS FOR LETTERS PATENT.

2376.—Hammond, J., Lewes, Sussex, "An improved method of and apparatus for the complete purification of coal gas by concentrated liquid ammonia, and the recovery of sulphur and ammonia, for the manufacture of sulphuric acid and sulphate of ammonia." June 14, 1878.

2389.—Wirth, F., Frankfort-on-the-Maine, Germany, "Improvements in the method of and apparatus for the manufacture of tar." A communication. June 15, 1878.

2397.—Lake, W. R., Southampton Buildings, London, "Improvements in apparatus for carburetting gas." A communication. June 15, 1878.

2399.—Thompson, W. P., Liverpool, "Improvements in and appertaining to the obtaining of light by means of electricity, and in apparatus therefor." A communication. June 17, 1878.

2401.—Dubos, C., Paris, "Improvements in apparatus for producing electric light." June 17, 1878.

2440.—Sugg, W. T., Westminster, "Improvements in counterbalances for gasholders." A communication. June 19, 1878.

2451.—Franzini, M. M., Naples, Italy, "An improved apparatus for lighting purposes." June 20, 1878.

2461.—Johnson, J. R., Red Lion Square, London, "Improvements in means or apparatus for measuring liquids." June 20, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

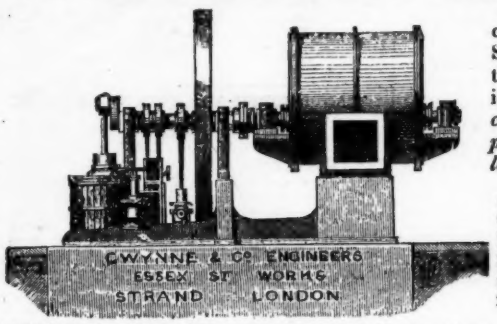
4816.—Hewit, J. M., Edinburgh, "Improvements in sliding pendants for burning gas, paraffin, or other oils." Dec. 18, 1877.

35.—Bean, E. C., Southsea, and Harbies, B., Landport, Southampton, "Improvements in the means of and in apparatus for flushing and after-flushing water-closets, and to prevent waste of water." Jan. 2, 1878.

39.—Benson, M., Southampton Buildings, London, "Improvements in pipe-joints for containing liquids, gases, and air, but more especially applicable to gas and water mains." A communication. Jan. 3, 1878.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

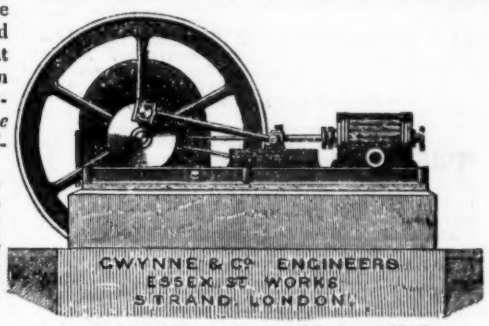
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

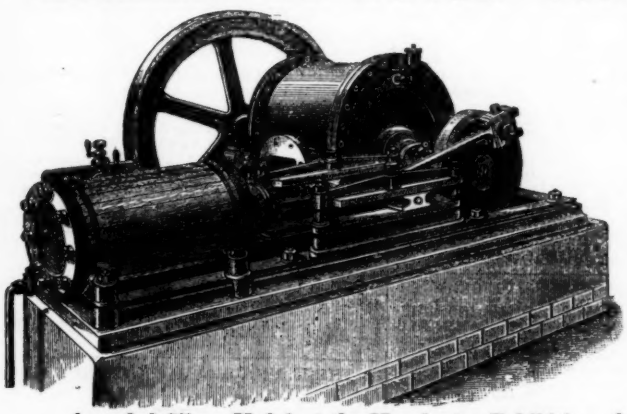
Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS

WITH

Wrought-Iron Spindles and

ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

Awarded Silver Medal at the Manchester Exhibition of the Society for the Promotion of Scientific Industry.

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS, BONNINGTON, EDINBURGH.

Now Ready, price 28s., handsomely bound in Morocco, cloth sides, gilt edged and lettered,

THE FIRST VOLUME

OF

KING'S TREATISE

ON THE

SCIENCE AND PRACTICE OF THE MANUFACTURE & DISTRIBUTION

OF

COAL GAS.

EDITED BY THOS. NEWBIGGING, C.E., M.Inst.C.E., AND W. T. FEWTRELL, F.C.S.

ORDERS RECEIVED BY THE PUBLISHER,

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

WANTED, a Working Foreman for a small Gas-Works on the South Coast. Would have to Stoke, Lay Services, &c. A knowledge of Engine and Exhauster would be desirable. There will be a man to assist in the winter. Wages 24s. per week, with the use of a cottage adjoining the works, and fuel and light free.

Copies of testimonials to be sent to No. 468, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RE-ENGAGEMENT Wanted, by a Gentleman, as ASSISTANT ENGINEER or MANAGER of Gas-Works; was nearly four years Assistant on Works producing over 200 millions on the Continent.

Address G. D., care of A. Dryden, Esq., 2, Birchin Lane, LONDON.

TO GAS ENGINEERS AND MANAGERS.

THE Advertiser seeks an engagement as FOREMAN of Retort Setters, or RETORT SETTER by Contract or Day. Now employed by The Gaslight and Coke Company, Beckton Works. Good references.

Address J. I., 62, Albert Road, NORTH WOOLWICH.

TO GAS COMPANIES AND MANUFACTURING CHEMISTS.

THE Advertiser wishes an engagement as MANAGER for the Manufacturing of Sulphate of Ammonia in all its branches of manufacture. Thoroughly understands the erection of Works in all its branches, and willing to erect Works and show the principles on agreement.

Address S. C., 63, St. Leonard Street, Bromley-by-Bow, LONDON.

A Gas Manager, presently in charge of Gas-Works in Scotland, is desirous of having charge of Works abroad. Trained in the Accountant and Working Departments.

Address No. 467, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A Young Man, aged 22, who has just finished a four years engagement with a provincial Gas Company is open to take a situation as Manager of small Gas-Works, or as Assistant to the Engineer of large Works. Can give first-class testimonials. Has no objection to go abroad.

Address No. 460, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man, aged 22, who has had five years experience in a Provincial Works (make, 75 millions), a SITUATION in a Gas-Works. Can use Photometer, fair Draughtsman, good Writer, quick at figures, and thoroughly understands general routine.

Apply S. I. C. E., 54, Hardress street, RAMSGATE.

WANTED, to invest from £5000 to £20,000 in the PURCHASE of Gas-Works.

Apply, by letter only, with full particulars, to No. 466, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. EVESON, Gas Coal and Cannel Contractor, BIRMINGHAM.

N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas; on Burners," &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

FOR SALE—One 50 ft. by 14 ft. Gas-HOLDER, nearly new, with Columns and Girders. Price £225, a bargain.

Also a STATION-METER, in good working order, to pass 15 000 feet per hour; and Four 10 ft. PURIFIERS with Hydraulic Centre-Valve.

Apply to J. S. REEVES, Manager, Gas-Works, BILSTON.

TO BE SOLD—The Stanstead and St. MARGARET'S GAS-WORKS, Hertfordshire.

For price and particulars, apply to GEORGE DAVIS, Wilmington, HULL.

A GAS PLANT to be Disposed of, capable of supplying with gas daily 18 burners, six hours, at the rate of 5 feet per hour.

For further particulars, apply to E. A. H., 2, Gothic Villas, WALTHAM CROSS.

FOR SALE, by the Swindon Gas and Coke Company, Swindon, Wilts, an old TELESCOPIC GASHOLDER, 30 ft. 6 in. diameter by 16 ft. deep, with four cast-iron Columns 17 ft. long, and Tie Bars; also the Bricks forming the Tank for the same. To be removed by and at the expense of the purchaser.

Tenders to be forwarded to the Secretary on or before the 1st of July, 1878.

The Company do not bind themselves to accept the highest or any tender.

HENRY HUNT, Secretary.

CARBON.—For Sale, at the Wrexham Gas-Works, about 20 Tons of RETORT CARBON.

Tenders to be sent to the MANAGER.

TWO Purifiers, 6 ft by 4 ft., 6-in. Valves and Connections, with Lifting Apparatus and Girders complete; also a Set of Twelve Pipe Condensers, all in working order, to be SOLD, a bargain.

Apply to Manager, Gas-Works, ENFIELD.

ON SALE—A Station-Meter (with new Drum), capable of passing 10,000 cubic feet per hour, with Hydraulic Valves, Bye-Pass, &c.; 10-in. Connections. Has been removed to make room for one of larger capacity.

For particulars and price, apply to GEORGE NEWTON, Gas-Meter Manufacturer, Union Street West, OLDHAM.

RIPON CORPORATION GAS-WORKS.

EXHAUSTER for Sale (by Dempster), with Engine, Bye-pass Valve, and Governor complete, capable of passing 3000 cubic feet per hour. Has been five years at work, and is in good repair, being sold to make room for a larger one.

Apply to GEO. IRVINE, Gas-Works, RIPON.

AMMONIACAL LIQUOR AND GAS TAR.

THE Southport Corporation invite Ten-DERS for the Purchase of all the AMMONIACAL LIQUOR that they will produce, and the Surplus GAS TAR that they will have to dispose of, at their Gas-Works, for the next One, Two, or Three years, from Nov. 18 next.

Form of tender and further information will be supplied on application to Mr. Iddon, the Manager.

Sealed tenders to be sent to me not later than Wednesday, July 10 next, endorsed, "Tender for Ammoniacal Liquor, or Gas Tar."

By order,
KEIGHLEY WALTON, Town Clerk.

WIDNES GAS-WORKS.

THE Gas Committee of the Widnes Local Board invite TENDERS for the REPLATING of a Single-Lift Gasholder, 50 ft. by 20 ft.

Specification and form of tender can be obtained from the undersigned.

Tenders, endorsed "Gasholder," and addressed to the Chairman of Gas and Water Committee, to be delivered at the Public Offices, Widnes, not later than the 1st of August next.

The Board do not bind themselves to accept the lowest or any tender.

HENRY ROBERTS.

Public Offices, Widnes, June 18, 1878.

TO MANUFACTURING CHEMISTS, &c.

THE Directors of the Airedale Gas Com-pany, Idle, near Leeds, are prepared to receive TENDERS for the Surplus TAR and the whole of the AMMONIACAL LIQUOR produced at their works during the Twelve months next ensuing, dating from July 1, 1878.

Particulars may be obtained on application to the Manager at the Gas-Works.

The whole of the Tar and Liquor will be pumped into a cistern ready for immediate delivery into the Contractor's tanks.

Tenders, stating price per ton, for the Tar and Liquor separately, to be forwarded to me not later than twelve o'clock at noon on Tuesday, July 2, 1878.

The Directors do not bind themselves to accept the highest or any tender.

By order,
EDWIN THORNTON, Secretary.

Gas Office, Idle, near Leeds, June 20, 1878.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Ilkley Gas Com-pany invite TENDERS for the TAR and AMMONIACAL LIQUOR produced at the Gas-Works, Ilkley, for Two or Three years, commencing July 7, 1878.

Particulars as to quantity, &c., may be obtained of the undersigned.

Tenders to be addressed to the Chairman, Gas Company, Ilkley, not later than the 2nd of July.

W. WEDGWOOD, Manager.

Gas-Works, Ilkley, June 22, 1878.

COAL CONTRACT.

THE Directors of the Stratford-upon-Avon Gas Company invite TENDERS for the Supply of 2000 Tons of good screened GAS COAL, to be delivered free upon their Siding, Great Western Railway Company, in monthly quantities, as may be required, between July 1, 1878, and June 30, 1879.

The Coal to be of good quality, and free from bats, bind, pyrites, and other refuse.

Parties tendering to state the kind of Coal, and from what district and pits obtained.

Terms of payment, net cash, monthly.

Tenders to be sent in not later than Monday, July 8, 1878.

The Directors do not bind themselves to accept the lowest or any tender.

J. S. CRANMER, Secretary.

June 21, 1878.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Wrexham Gaslight Company invite TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works for One, Two, or Three years, commencing on the 1st of August next. Quantity produced about 200 Tons and 300 Tons respectively.

Further information may be obtained upon application to the undersigned, to whom tenders must be sent on or before the 1st of July next.

The Directors do not bind themselves to accept the highest or any other tender.

THOS WALKER, Secretary and Manager.

Wrexham, June 12, 1878.

TO MANUFACTURING CHEMISTS, &c.

THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive TENDERS for the Purchase, at per Ton, of all the Surplus TAR and AMMONIACAL LIQUOR produced at their Gas-Works in Clayton, from July 1, 1878, to June 30, 1879. The Contractor to load and cart the said material at his own cost.

Sealed tenders, endorsed "Tender for Tar and Liquor," to be delivered, addressed to the Chairman at the Gas-Works, at or before noon on Saturday, the 29th of June inst.

The Directors do not pledge themselves to accept the highest or any tender.

By order,
JOHN NIVEN, Secretary and Engineer.

Gas Offices, Clayton, near Bradford,
Yorkshire, June 15, 1878.

OVER DARWEN LOCAL BOARD.

TO GAS ENGINEERS AND IRONFOUNDERS.

THE above Board invite Tenders for alterations to an existing SCRUBBER; also for one new Cast-Iron SCRUBBER, 50 ft. by 10 ft., with 16-inch Valves and Connections for both.

Particulars can be obtained, and plans and specifications seen, on application to the undersigned.

Tenders, endorsed "Tender for Scrubbers," to be addressed to C. Costeker, Esq., Law Clerk, Darwen, on or before the 1st of July next.

THOS. DUXBURY, Manager.

June 4, 1878.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

COAL CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of 10,000 Tons of GAS COAL, to be delivered alongside the Company's premises at Wandsworth.

Printed conditions of tender may be obtained on application to the Secretary of the Company, and tenders must be sent in, marked "Tender for Coals," on or before July 1 next.

The Directors do not bind themselves to accept the lowest or any tender.

C. W. GRAY, Secretary.

North Street, Wandsworth, June 20, 1878.

BELFAST CORPORATION GAS-WORKS.

TENDERS FOR COAL.

THE Gas Committee of the Belfast Cor-poration invite TENDERS for the Supply of 50,000 Tons of B st GAS COAL, to be delivered ex ship at Belfast, or at the Coal Wharf at the Gas-Works, during the year commencing in August next.

Tenders for less than 20 000 Tons will not be considered.

Parties tendering are also requested to quote prices for One, Two, or Three years supply of 50,000 Tons each year.

Monthly quantities and further information may be had on application to the Manager at the Gas-Works.

Tenders, endorsed "Tender for Coal," must be received not later than July 3.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
SAMUEL BLACK, Town Clerk.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TAR AND AMMONIACAL LIQUOR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR made at their Works, Egerton Street, Sion Street, Radcliffe, for a period of One or Two years, commencing from the 1st day of August next.

Tenders must state the price which will be given per Ton for Tar or Ammoniacal Liquor, separately or together; the purchaser to provide barrels and cartage from the Works, and the Company to fill them on the Works.

The purchase to be paid for monthly.

Tenders to be sent to the Manager and Secretary not later than Thursday, July 4, 1878.

By order,
JOHN BRANDWOOD, Manager and Secretary.

Sion Street, Radcliffe, May 24, 1878.

THE LLANDUDNO IMPROVEMENT ACTS, 1854 AND 1876.

TENDERS FOR GAS COAL.

THE Llandudno Improvement Commis-sioners invite TENDERS for the Supply of GAS COALS.

The Tenders to be for One, Five, or Seven years, at the option of the Commissioners.

To be delivered in such quantities and at such periods as may be required.

The quantity required is estimated at about 1500 Tons per annum.

Parties tendering to give separate prices for Cannel Coal, Best Gas Coal, and Gas Coal and Cannel Mixture, delivered, carriage paid, at the London and North-Western Railway Station, Llandudno.

Sealed tenders, endorsed "Tender for Gas Coal," to be delivered to the undersigned, not later than by the morning postal delivery of Thursday, July 4 next.

The Commissioners do not bind themselves to accept the lowest or any tender.

THOMAS T. MARKS, C.E.,
Engineer and Clerk to the Commissioners.

June 15, 1878.

CAMBRIDGE UNIVERSITY & TOWN GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of this Company are prepared to receive TENDERS for Screened COAL and NUTS, to be delivered, carriage free, on to their sidings in Coldham's Lane, in the following monthly quantities—viz.:—

		Coal.	Nuts.
Aug., 1878.	. .	200	200 Tons.
Sept., ,,	. .	300	200 ,,
Oct., ,,	. .	600	400 ,,
Nov., ,,	. .	900	600 ,,
Dec., ,,	. .	900	600 ,,
Jan., 1879.	. .	900	600 ,,
Feb., ,,	. .	600	400 ,,
Mar., ,,	. .	600	400 ,,
April, ,,	. .	500	300 ,,
May, ,,	. .	500	300 ,,
Total	. .	6000	. .4000 Tons.

They are to be the best of their kind, and free as possible from sulphur, bats, or bind, and be weighed 20 cwt. to the ton.

Payment will be made monthly, but the Directors do not bind themselves to accept the lowest or any tender, until after a fair trial of the Coal.

Sealed tenders, addressed to the Chairman, to be delivered not later than Wednesday, July 3, 1878.

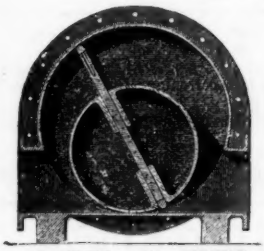
JAMES WEEKS, Manager.

Gas Office, Cambridge, June 20, 1878.

J. BEALE'S NEW PATENT GAS EXHAUSTERS,

MANUFACTURED SOLELY BY

B. DONKIN & CO.



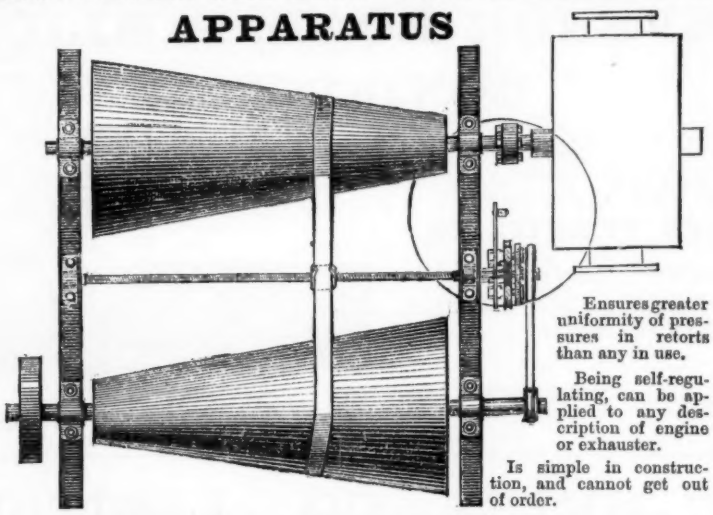
These Exhausters have but one solid slide, which ensures less wear and tear, and less friction, and thus fewer repairs are necessary. They are made with two outside bearings and all latest improvements.

MESSRS. B. D. & CO. ALSO MAKE

STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
VALVES FOR GAS, WATER,
STEAM, HYDRAULIC MAIN, TAR, AMMONIACAL LIQUOR, &c.

WORKS: 55a, BLUE ANCHOR ROAD, BERMONDSEY, LONDON, S.E.

FISON'S PATENT SELF-REGULATING GAS-EXHAUSTING APPARATUS



Ensures greater uniformity of pressures in retorts than any in use.

Being self-regulating, can be applied to any description of engine or exhauster.

Is simple in construction, and cannot get out of order.

JASPER & WM. SNOWDON, Manufacturers,
OLD BANK CHAMBERS, PARK ROW, LEEDS.
Full Particulars, Testimonials, Descriptive Circulars, Estimates, &c., on application.

GEORGE NEWTON,
UNION STREET WEST, OLDHAM,

MANUFACTURER OF
SQUARE STATION-METERS, with PLANED JOINTS;
ROUND STATION-METERS, WITH CAST-IRON STANDS;
WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

MANCHESTER CORPORATION GAS-WORKS.

AMMONIACAL LIQUOR.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR to be produced at their Gaythorn and Rochdale Road Works during a period of One or more years, commencing from the 1st day of January, 1880.

In addition to tenders for the purchase of the Liquor in its crude state, the Committee will also be prepared to consider TENDERS for its DISPOSAL, either by manufacture into Sulphate of Ammonia at the above-mentioned Works on their behalf, or in any other manner.

The Committee reserve to themselves the option of accepting the offer, the terms of which they may deem most advantageous.

They do not bind themselves to accept the highest or any tender.

Sealed tenders, addressed to the Chairman of the Gas Committee, Town Hall, and endorsed "Tender for Ammoniacal Liquor," must be delivered at these Offices, on or before Thursday, the 1st day of August next.

Forms of tender and further particulars can be obtained on application to Mr. George B. Jackson, at the Gas Offices. By order of the Gas Committee,

JOSEPH HERON, Town Clerk.

Town Hall, Manchester, May 31, 1878.

A PAMPHLET ON DIP-PIPES, &c., post free 6½d., on application to W. WHITE, Gas-Works, Abersychan, MON. See Reviews in the *Gas Trade Circular and Review*, March 29, 1878, and *Design and Work*, March 30, 1878.

DISCOVERY in Gas Making.—Tar obviated. Increase in Gas, much purified. The process simple.

A liberal share offered to one who would enter into the practical working.

Address R. MARTIN, Bishopric House, Horsham, SUSSEX.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

W. LIDDALL,
Public Accountant,
15, UNION COURT,
OLD BROAD STREET, E.C.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

WILSON'S
SAFETY
AUTOMATIC PRESSURELESS DIP-PIPE,
SELF-CLEANING HYDRAULIC MAIN.
See Illustration and Description in JOURNAL OF GAS LIGHTING, *Dec. 4.*

Improved SCRUBBER, with Self-Acting Water Distributor.

Improved HYDRAULIC CENTRE-VALVE to work three or four purifiers.

Improved HYDRAULIC LIFT, by which one man can raise and remove purifier-covers of any size.

Plans and specifications prepared for New or for the Remodelling of existing Gas-Works.

Special Designs for Gas-Works for Tropical Climates.

Particulars, &c., to be had of the Patentee, Inventor, and Manufacturer, W. P. WILSON, Consulting Engineer, 80, Cannon Street, LONDON, E.C.

MANN & OWENS
PATENT SCREW & CAM GAS-VALVES.
SIZES from 2 In. to 48 In.

As supplied to
THE GASLIGHT & COKE CO., LONDON:
The CORPORATIONS of MANCHESTER, BIRMINGHAM, CARLISLE, OLDHAM, STOCKTON, HALIFAX, &c.
And to the following Companies—viz.:
PHŒNIX, SOUTH METROPOLITAN, BRENTFORD, WINDSOR ROYAL, IPSWICH, WEST HAM, BILSTON, ARUNDEL, DUDLEY, ST. HELEN'S, MORECOMBE, THRAPSTONE, &c.,
And to the various WORKS of the
BRITISH GASLIGHT COMPY.

Every Valve warranted perfectly Gas-tight.

SOLE MAKERS, S. OWENS & CO.,
ENGINEERS,
WHITEFRIARS STREET, LONDON.
PRICES ON APPLICATION.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to

FRANK M'GEDY, Secretary.

126, Chancery Lane, London.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67 *candle gas, with* 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON.

THE BROUGHTON COAL COMPANY,

COLLIERIES, NEAR WREXHAM,

Are prepared to Supply their excellent GAS COAL on very favourable terms.

This Coal yields more than 10,000 cubic feet per Ton of gas of good quality, *in practical working on the large scale.*

A large purchaser reports the coke to be clear, of a quality rarely equalled in the retort-furnace, and much liked by the stokers.

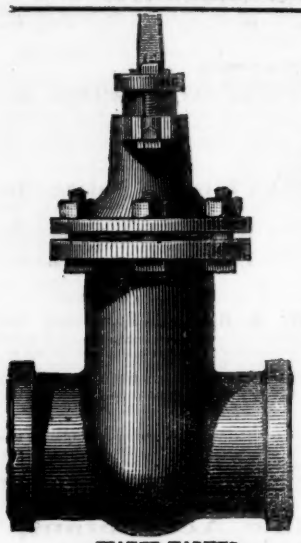
METALLIC OXIDE PAINT,

Specially adapted for painting Iron and Woodwork in and about **Gas-Works**, as it is not affected by the ammoniacal gases always present, but will keep its **Colour and Hardness** under the most trying circumstances; it forms a very hard surface, and effectually prevents iron from corroding; it will not crack or blister, and resists alike the heat of summer and the cold of winter.

Used extensively throughout Lancashire, Yorkshire, and neighbourhood. Among our customers are the following:—The Manchester and Salford Corporations the Gas Companies at Rochdale, Sowerby Bridge, Halifax, Stalybridge, Blackburn, Leigh, St. Helen's, &c.

Supplied mixed ready for use, or in stiff paste.

J. E. WILLIAMS & CO., VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.



WATER-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

SIMPSON & COMPANY,

ENGINE-WORKS,

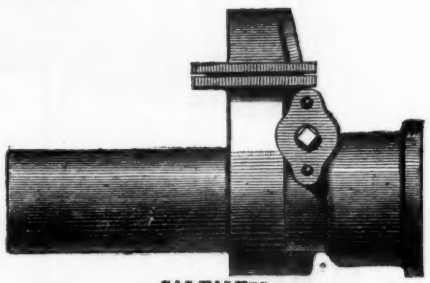
GROSVENOR ROAD, PIMLICO,

LONDON.

SCREW-COCKS, HYDRANTS,
SLUICES, PENSTOCKS,

And all other Machinery for

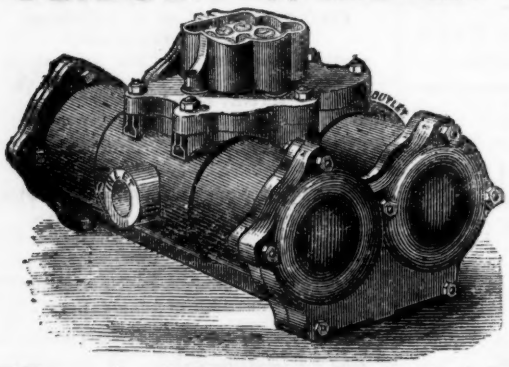
WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



GAS-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.

THE

UNION WATER-METER CO., LIMITED.



The above Company, having purchased the patent rights of the Union Water-Meter, are prepared to receive and execute orders for their Patent Positive Meters, which are simple and compact.

Upwards of 20,000 of these Meters are in successful operation in the principal cities of the United States, and have also been tested and approved by some of the leading Engineers in this country.

For Prospectuses, Prices, &c., apply to the

COMPANY'S OFFICES:

No. 4, NEW BROAD STREET, LONDON, E.C.

THE

STANDARD WASHER AND SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.
Unerring Regularity in the Distribution of the Liquor.
Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.
Economy of Space, thus enabling the Apparatus to be protected from the Weather.
Economy of First Cost and of Maintenance.
It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

Applications for Prices, &c., to be made to

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

SAMUEL CUTLER & SONS,

CONTRACTORS FOR GAS AND WATER WORKS, GENERAL ENGINEERS,

IRONFOUNDERS, AND MANUFACTURERS

OF

GASHOLDERS, TANKS, PURIFIERS,

SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS,

AND

GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

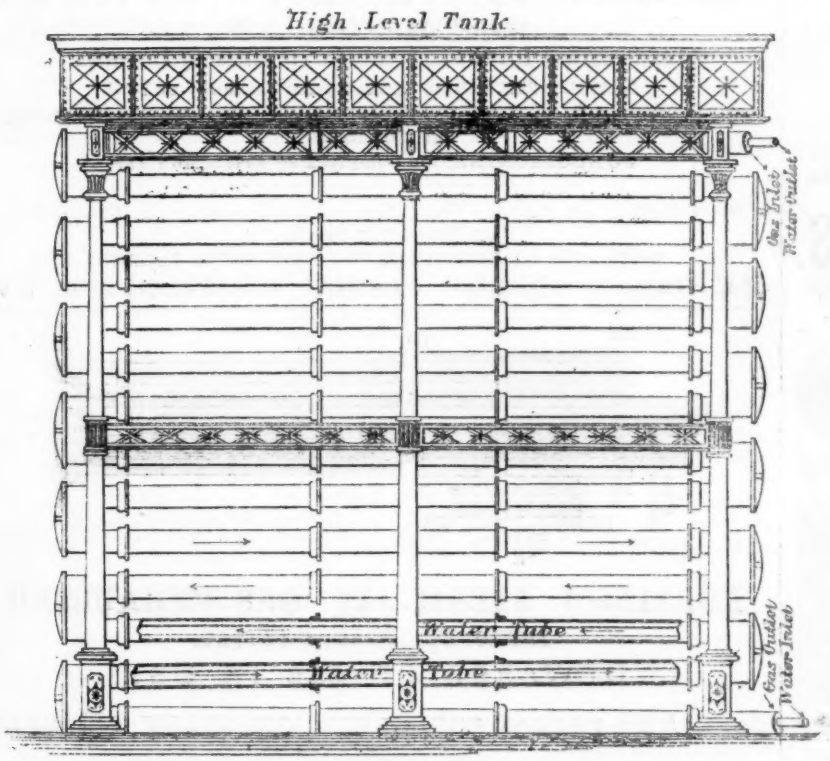
MANUFACTURERS OF

MORRIS & CUTLER'S PATENT CONDENSER

AND

CUTLER'S PATENT GAS-WASHER.

(For Illustration and Description, see "Journal" for June 11, page 925.)



Description of Morris & Cutler's Patent Condenser.

The Condenser may consist of pipes arranged in tiers as shown, or in any other form most convenient to the site available, each tier being connected with special connexions, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. (The Condenser itself may form the support for a high-level cistern as illustrated.) By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control.

The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to

Mr. F. MORRIS, GAS-WORKS, BRENTFORD,

OR TO

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL (Near the Steamboat Pier), LONDON, E.

TORBAY AND DART PAINT COMPANY, LIMITED.

WORKS:
DARTMOUTH & BRIXHAM (TORBAY) DEVON.
OFFICES:
3, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

SOLE PROPRIETORS AND MANUFACTURERS OF
WOLSTON'S CELEBRATED
TORBAY IRON PAINTS.

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

SILICATE PAINTS.

THE BEST & CHEAPEST
For every purpose to which Paint is applied.

MANUFACTURED IN ALL COLOURS BY

THE SILICATE PAINT CO.,

LONDON— 107, CANNON STREET, E.C.
LIVERPOOL— SEEL STREET.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,
Brassfounders, Gauge njector and Tool Makers,
ALBION WORKS, SALFORD, LANCASHIRE.

CLOTH GAS-BAGS FOR MAINS.

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,
107, GOSWELL ROAD, LONDON, E.C.

GREAT SAVING OF LABOUR.
ENOCH'S PATENT
PORTABLE DRILLING-MACHINE,

Now in use by all the Principal Gas and Water Companies in the United Kingdom.

E Size, for Services in Pipes, 2 to 3 in. bore	£3 10 0
F Size, for Services in Pipes, 2 to 4 in. bore	4 0 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp.	4 10 0

Drills, 1s. 6d. each.

Machines sent on approval, if desired.

Prices for other Sizes and Modifications, with full Particulars and Testimonials, on application to

ALEXANDER ANDERSON.

Office: 9, London Street, E.C. Warehouse: Vine Street, Minories, London, E.

GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS
BY THEIR
PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.

The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.

The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.

It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,
35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

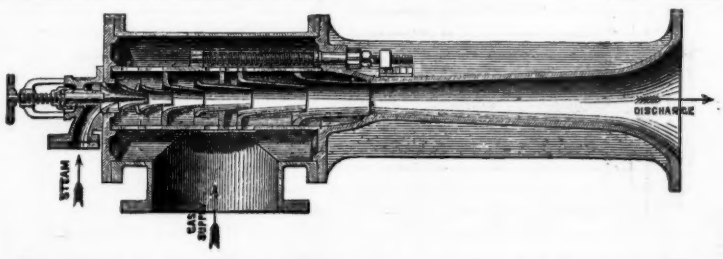
RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

JAMES MILNE & SON,

GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

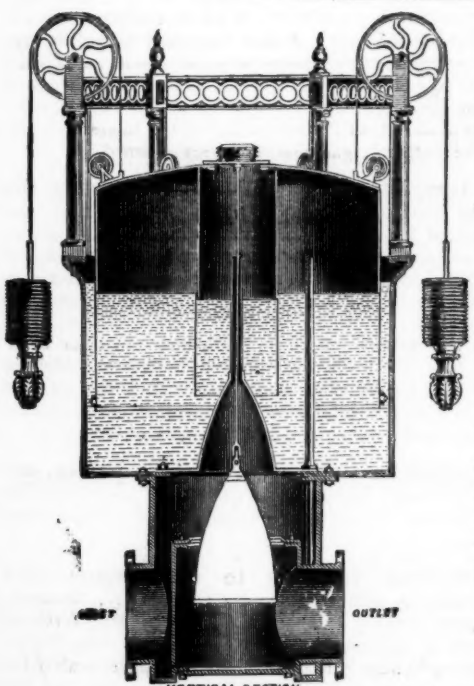
J. & J. BRADDOCK,

GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.
The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.
The above forms are registered.
Water Companies Accounts also prepared and adjusted.
CONSULTATIONS.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

MR. EDWARD SANDELL,

Associate of the Society of Accountants in England,
Publisher of the
"Gas Companies Expenditure Journal,"
Begs to announce his REMOVAL from Skinner's Place, Size Lane, to
No 2, ST. GEORGE STREET, WESTMINSTER.

Mr. ROBERT DEMPSTER, Sen.,

CONSULTING GAS ENGINEER,
Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,
ELLAND, near HALIFAX,
May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.
GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTER-MIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS CARR & SON,

MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,
SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.
Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

BIRTLEY IRON WORKS,

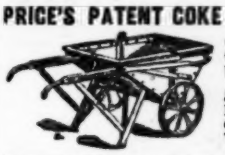
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

BOUCK & CO., LIMITED,

TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.
BRANCH WORKS, BLACKBURN.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

PRICE'S PATENT COKE & COAL BARROW



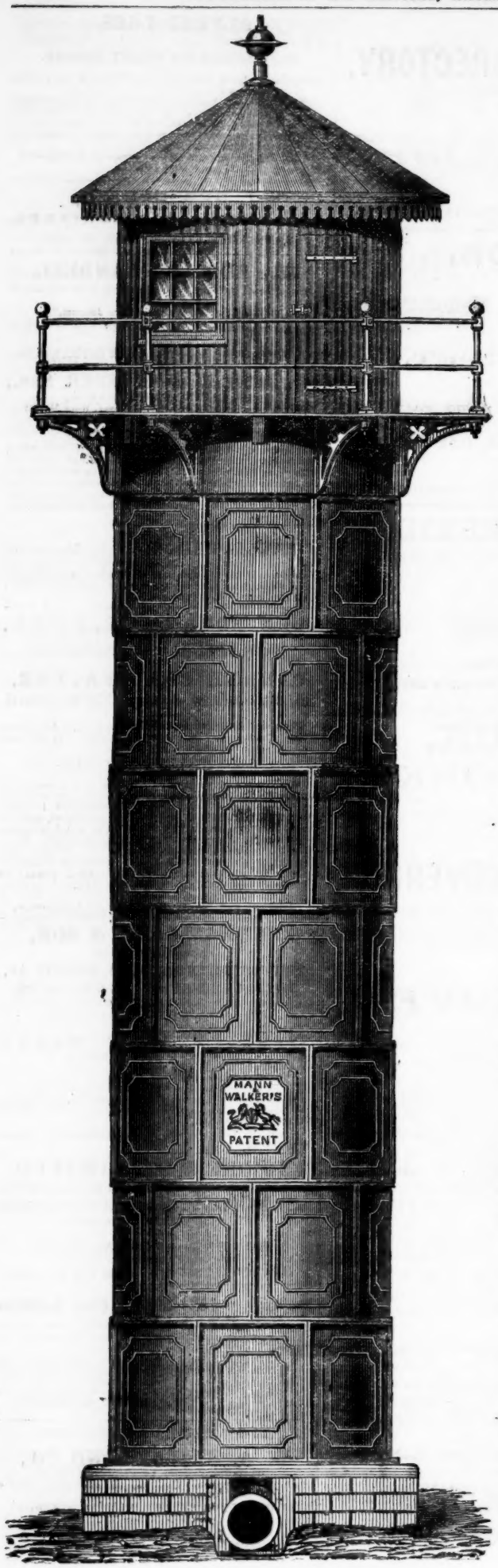
effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

TO GAS-METER MANUFACTURERS.

G. A. BAILEY AND CO.,

MANUFACTURERS OF EVERY DESCRIPTION OF
Station, Hourly Rate, Experimental, and other Indexes, Wheel and Worm Cutters,
86, CRAMPTON STREET, NEWINGTON BUTTS, LONDON, S.E.

N.B.—Materials found or otherwise.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

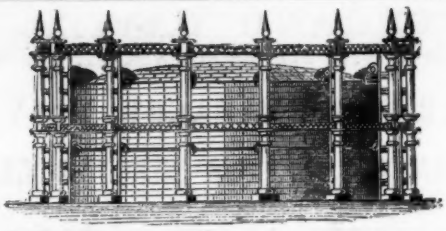
By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.

Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

YEO'S PATENT ENGINE PACKING,

Price 1s. 8d. per lb., any size.

Tarred & White Spun Yarn for Pipe Joints, at various prices.

Samples and testimonials free per post.

E. YEO, NEWTON ABBOT.

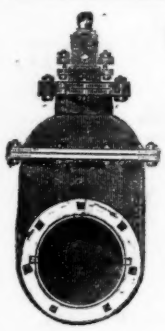
THE AMERICAN GAS-LIGHT JOURNAL.

A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Subscriptions at $3.50 per annum, post paid, to Great Britain, may be made direct by forwarding Post Office Money Order or Draft to the above address. Rates of advertisement, $2.00 an inch. Special rates for larger spaces.



C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.

These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

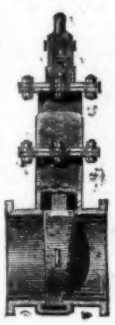
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

IMPROVED COMPENSATING GAS-METER.

HUNT'S PATENT.

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